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THE UNIVERSITY OF ALBERTA

CHEMISTRY TEACHER'S ROLE IN CURRICULAR DECISION MAKING

by

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A THESIS

SUBMITTED TO THE

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Date Sept. 29, 1981

ABSTRACT

This investigation focused on the teachers' perceptions of their curricular decision making and on the nature and scope of the decisions teachers made as they implement, adapt and create curriculum for their Chemistry 20 classes. Four research questions directed the inquiry and a questionnaire and interview schedule were the data gathering instruments used.

The teachers in the sample were found to be critical participants in the curriculum decision making process. Functioning at the interface of curriculum and instruction they translated an intended curriculum into instruction in an environment they perceived to be relatively unrestricted. There was a feeling that teachers currently have more control than they desire, particularly in the area of evaluation. Teachers relied heavily on the prescribed core reference and their own interests and experiences when making implementation decisions. Teachers "adapted" rather than "adopted" the program outlined for implementation. They emphasized the cognitive, discipline orientated goals and focused on the core portion of the program. The time allocated to the elective portion of the program was either usurped by the core or spent on "core-like" material. Teachers were less involved in curriculum creation than in curriculum implementation or adaptation. Curricular decisions made varied more with the size of the Chemistry 20 staff and the core reference adopted than with the

teacher's professional background.

Curriculum planning is a human process which can be improved by discovering and critically analysing what exists. This study was undertaken, in light of this assumption, and the findings have implications for those charged with making curricular decisions at the instructional, institutional and societal level.

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> The curriculum has staunchly resisted being a 'product', an external entity to be handed over intact to the teacher for transmission to students. Several of the new curricula have spent millions of dollars on the production process. They have involved the foremost scholars in the field. They have worked out in detail their aims and objectives and implied learning experiences. They have produced books, slides, tapes, films etc. as communication means. They have developed inservice programs. All this was desirable and necessary but has proved insufficient for it has not taken into account the complex and powerful interplay of the forces within the school and classroom. The classroom climate... exercises an alchemy of its own on adopted programs.
>
> (Hughes, 1973, p. viii)

CHAPTER I

THE PROBLEM

Background of the Study

Curriculum is conceived of in a number of ways and perceived from a number of viewpoints. This creates the ambiguous situation in which for any group of students there are several simultaneous curricula - one legislated, one approved by the local school board, one adopted by the individual schools, one presented by the teacher and one experienced by the students. Curriculum decision making goes on wherever there are people interested in, or responsible for, an educational program.

Goodlad (1979), in attempting to reduce this ambiguity, describes three levels of curriculum decision making: societal, institutional and instructional. He suggests that the task of the curriculum researcher is to "choose his perspective and then initially to describe what he sees" (p. 29).

It is the teacher that is the focus of this study; the investigation probes into what is the role teachers perceive themselves to be taking in implementing, adapting and creating curriculum. The suggestion is not, however, that the teachers' role can be considered in isolation, as there is a great deal of interaction between the various levels of curriculum decision making. The teachers' role was selected as it is considered critical in the curriculum planning process because it

operates at the interface of curriculum and instruction.

> The heart of the curriculum lies in what happens in the individual classrooms. The teacher, more than anyone else, determines whether the curriculum is a good one. (Zaccaria, 1970, p. 86)

At various times in history, the emphasis on where curricular decisions should be made, has moved back and forth on a centralized-decentralized continuum. At one end we have the "top down" approach, in which the curriculum is prescriptive and teachers are required to carry out curricular and instructional decisions made by others. At the other extreme is the "bottom up" or school based curriculum, initiated and developed by individual schools or teachers. Connelly (1972) suggests that both extremes, treating teachers as mere transmitters of ideas or as the sole initiators of ideas and materials are inadequate.

Prescriptive theories suggest what classroom teachers ought to be doing in each of these decision making hierarchies, but few empirical studies identify what they actually do. There is considerable evidence that teachers opt for their own desired level of decision making, regardless of which end of the continuum is considered prevalent at the time.

The real "makers" of the curriculum may be the teachers, as they construct an operational curriculum in conjunction with their students and appropriate to their situation. Teachers, whether they realize it or not, have always been involved in curriculum development.

They have always interpreted courses and syllabuses in light of situational and personal factors. Innovations can be affected by the human element as classroom teachers make decisions not only on how they will teach, but may be actively engaged in selecting, adapting or developing objectives, content, and resources for their classroom.

> The teacher can resist, modify or even openly reject preceding decisions - in which case the curriculum planned at societal and institutional levels may never have a chance of being implemented. But even if the teacher accepts and thinks he understands the curriculum planned at preceding levels, there are likely to be difficulties in translating these formal plans into an operational curriculum in the classroom. Among them are the skills, knowledge and attitudes which the teacher possesses, the materials for use in refining and implementing the curriculum, the operational definition of significant elements in the subject matter; the role of the students in the process; formative and summative evaluation procedures and instruments; the organization centers provided students; and many more. (Goodlad, 1979, p. 184)

Many new curricula have been designed and adapted but few have been implemented (Fullan, 1977). The secondary school science programs developed by projects in the sixties illustrate new programs which tended to the prescriptive-centralized end of the continuum. Programs were mainly designed by groups of experts and included what was to be achieved, how it could be managed and ways of knowing if goals were reached. Such programs were initiated as a result of societal level decisions accepted at the institutional level and implemented by teachers for whom tremendous effort and funds were

provided for "inservice" in the ways of translating the products of others' efforts into classroom instruction. The gap, reported by evaluators (Gallagher, 1966), between actual and intended outcomes was discouraging to those favoring the top down approach. Even in highly prescriptive programs, teachers exercise their autonomy when the classroom door is closed.

Attempts to implement a bottom up curriculum development system have also been affected by teachers' decisions when teachers were not willing or did not have the resources to make all of the curricular decisions being asked of them. In this situation, they relied heavily on published materials or other established programs rather than design a curriculum that was entirely their own.

The final determination of the curriculum takes place in the learning situation itself. It is the classroom teacher that may make the most important decisions, that determine the quality of the student's experience.

> ...teachers are likely to do as they want to do when the classroom door is closed. There is no such thing as idea tight, uniform administration of the curriculum. (Doll, 1978, p. 355)

Identification of the Problem

The often illustrated gap between theory (how we think it is or how we think it ought to be) and practice (how it is) makes apparent the need to discover more about what actually takes place at any level of curricular decision making but particularly what takes place at the

5

classroom level.

> It has been my contention for some years that curriculum inquiry must move back to the basics and there is nothing more basic for study than what people practice or do, good or bad, right or wrong. (Goodlad, 1979, p. 40)

Teachers have been identified as critical participants (even though they are often not recognized as such) in curriculum decision making.

There is a need to look at teacher-made curricular decisions in a naturalistic and descriptive way to add to the minimal amount of information currently available on the role classroom teachers actually play in constructing the curriculum (Jackson, 1968; Hughes, 1973; Pylypiw, 1974; Doll, 1978).

Purpose of the Study

This study is concerned with what teachers do with the curriculum as they receive and perceive it. The investigation focused on the teachers' perceptions of their curricular decision making and on the nature of the decisions teachers make as they are involved in curriculum implementation, adaptation and creation.

The intent is to look at the reality of the teacher as a curriculum decision maker. The emphasis is on the practical, what is, rather than what ought to be. The study is exploratory in nature, rather than designed around strict a priori hypotheses. As Jackson (1968) suggests:

> Almost as important as observation per se is the requirement of keeping an open mind about what

> we see. Our ways of looking at the classroom should not be unnecessarily restricted by prior assumptions about what should be going on there. (p. 176)

The purpose of this study is to identify the teachers perception of the nature and scope of their curricular decision making. Particular attention will be given to seeking answers to the following research questions:

1) What is the nature and scope of teacher decision making related to curriculum implementation?

   As teachers translate into instruction the curriculum that was established at the societal and institutional levels they make curricular decisions. What or whom do they rely on when making these decisions? How much freedom do they feel they have? How autonomous are they in their decision making? How much control of program and evaluation do they have and how much control do they desire?

2) To what extent and in what ways are teachers involved in decision making related to curriculum adaptation?

   Before adapting a program teachers have to evaluate the perceived curriculum. What changes do they feel would improve the program? Do they stress some goals over others? Do certain concepts in the program outline receive more emphasis than others? Do they revise sequence or time allocations?

3) To what extent and in what ways are teachers involved in de-

cision making related to curriculum creation?

The focus in this area of teacher decision making is on "what" shall be taught. When the program allows for teacher selection of topics and goals - what selections are made? What factors affect the selection process? Do teachers see the decision selection of what is to be taught at their level as advantageous? To what extent are teachers involved in creating curriculum?

4) What is the relationship of size of school, professional background of the teacher, and choice of prescribed core reference to the three previous areas of teacher decision making?

Assumptions

This study is based on the assumptions prevalent in the literature that:

- teachers participate extensively in curriculum decision making and individually and collectively, make decisions which significantly affect the curriculum.
- the teacher is primarily involved in decision making at the instructional level but may be making curricular decisions at other levels as well.
- curriculum planning is a human process which can be improved through inquiry and critical analysis of what exists.

Definition of Terms

Curriculum - a series of planned events that are intended to have

educational consequence for one or more students (Eisner, 1979).

Curriculum decision making - decisions made by a member of the educational community to do something which is intended to result in the commitment of the school systems time, space, personnel, effort, and funds or material.

Levels of curriculum decision making - location of decision making agents or agencies on the centralized-decentralized continuum. It is represented by Goodlad (1979) as societal, institutional and instructional levels and more specifically in this study as the province, the school system (district, division, county), the school and the teacher.

Decentralization - the dispersion of authority to make curriculum decisions at a more local level.

Curriculum implementation - the translation of the curriculum as the teacher perceives it into action. The teacher uses as a point of departure a curriculum decided upon at the societal, institutional or instructional level and then must operationalize it.

Curriculum adaptation - changes are made in the perceived curriculum while attempting to maintain the intent of the curriculum developers.

Curriculum creation - developing curriculum plans that involves establishing goals and choosing themes or topics through which the goals can be achieved.

Curriculum consultant - "out of school" personnel whose job description includes assisting teachers in their curriculum decision

making. They may function at the system or provincial level.

Delimitations of the Study

The content of the curricular decision making examined in this study is according to Goodlad (1979), operational. That is the focus is on the decisions that are made as the teacher perceived formal curriculum is implemented. The curriculum that the teacher uses as a point of departure is a product of other levels of decision making. While acknowledging that teacher decision making occurs within a larger cultural, social and political context, decisions made at other levels are only of interest to this study in so far as they directly affect decisions that are made at the instructional level.

With the curricular content of the study identified, the second delimitation involves choice of perspective. The decision was made to view the operationalizing of the curriculum through the eyes of the teacher. It is acknowledged that the perspective of others, i.e. student's, parent's or principal's may not coincide with the teacher's perceptions of their decisions. Curriculum may be viewed as a process in which there is constant interpretation and negotiation going on among teachers and students. In this sense there are as many curricula as there are participants in the process. While recognizing the existence and importance of this "experienced curriculum" this study was restricted to the "teacher lived" curriculum and to an examination of the teachers self-perceptions of their curricular decision making.

Since differences may exist in the nature of decision making in various subject areas, the decision was made to restrict the scope of this study to one subject area - Chemistry. Secondly, because teacher decision making may differ with grade level the investigation was further restricted to Chemistry 20 teachers. The current Chemistry 20 program outlined in the Chemistry 10, 20, 30, Curriculum Guide (1977) could be placed on neither end of the centralized-decentralized continuum. The core part of the program delineates aims, objectives and specifies concepts to be obtained. The elective portion makes suggestions of possible content but also allows for local selection and/or development. With these considerations in mind Chemistry 20 seemed to be a potentially fertile area to which investigation was delimited.

Limitations of the Study

The sample of the study was drawn from the population of Chemistry 20 teachers within an approximate 60 mile radius of the city of Edmonton. Because all of the teachers were drawn from this one geographical area the generalizability of the findings of the study are limited. The results of the study are also limited by the methods of inquiry used. The nature and scope of the "observation" techniques utilized--a questionnaire and an interview schedule--limited the information sought and received.

Organization of the Thesis

In Chapter I the problem is introduced, four research questions

are delineated, the terms used are defined and the underlying assumptions, delimitations and limitations outlined.

Chapter II provides a backdrop for the study by reviewing the literature related to the teachers' role in curriculum decision making.

Chapter III describes the design of the study. It describes the selection of participants in the study and the data collecting procedures that were used.

Chapter IV presents an analysis and discussion of the findings related to the research questions.

Chapter V provides a summary of the study, conclusions, implications and recommendations for further research.

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CHAPTER II

REVIEW OF THE RELATED LITERATURE

What is Meant by "Curriculum"?

The term "curriculum" is used in educational discussions in a wide variety of ways. In the ancient world a curriculum was a running track (Hughes, 1973). It was no doubt planned by someone interested in what would take place on the "course" and the educational use of the term evolved metaphorically as the course of studies to be "run" by the students. The progressive educators in the 1920's sought to broaden this conception of curriculum by focusing on the student, and conceived of curriculum as the "learner's experience." The varying ways of defining curriculum is reflected in the variety of ways the term is used:

> 'Let me show you our curriculum,' said the principal to the visitor to his school.... as he removed from his desk a mimeographed document.... The visitor scanned the document and replied, 'Now let me see your real curriculum'...I must spend at least a few hours in your school. I need to visit several classrooms at random...stand in hallways ...wander through the cafeteria...visit the library...follow the children out to the playing field.... By doing these things I'll have at least a limited view of your real curriculum.' (Doll, 1978, p. 278)

The discussion illustrates the scope possible in defining curriculum. One conception focuses on the product of a planning process, the established framework, or the "course to be run" by students. The

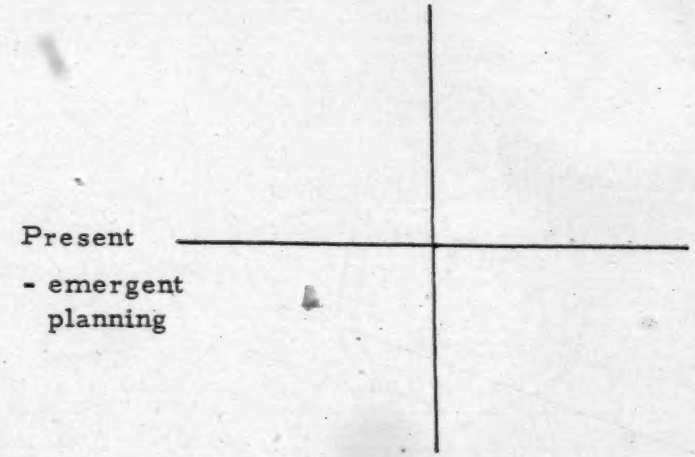
other focuses on the experiential and becomes as "big, broad and all inclusive as the lives of people in a major, thriving...institution" (Doll, 1978, p. 279).

Goodlad (1979) tried to clarify the use of the term by examining five curricular domains: ideal, formal, perceived, operational and experienced. Ideal curricula emerge from an idealistic planning process and "are designed to serve a varied marketplace of decisions and actions and stop short of the give and take of the sociopolitical process" (p. 60). Formal curricula are official or sanctioned written plans, usually imbedding society's interests. Perceived curricula are curricula of the mind - the reality of a curriculum "in the eyes of the beholder." What the teachers perceive the curriculum to be is included in this third domain, but how they translate it into action may be quite another thing. This is the operational curriculum; the enactment of the perceived formal curriculum. The fifth domain is experiential curricula; the curriculum from the students perspective. Clarifying the curricular domain helps clarify what is meant by the term "curriculum" and provides an avenue for arriving at a functional definition.

Eisner (1979) attempted to clarify the conception of curriculum by the use of intersecting continua; one dealing with scope and the other with time. Curriculum planning may take place at any point on the resulting grid and this location implies a certain conception of curriculum.

Molar

e.g. policy decisions re what shall be taught in a province



Molecular

e.g. particular decisions re suitability of one learning activity relative to another

What becomes clear from both Goodlad's and Eisner's attempts is that a single arbitrary definition of curriculum, even if possible, is not necessary or desirable. What is needed is an operational definition that indicates the conceptualization or domain of the term. Eisner (1979) proposes:

> I am not claiming to formulate a 'real' definition. Curricula are not natural entities whose necessary and sufficient properties are capable of being discovered once and for all. What I am doing is formulating a concept of curriculum that I believe to be useful.... 'The curriculum of a school, or a course, or a classroom can be conceived of as a series of planned events that are intended to have educational consequence for one or more students.' (p. 39)

Such an operational definition is useful to this study. It takes a stand on several issues prevalent in curricular definitions. The first area of contention is whether curriculum is planned with foresight or whether it is something which just happens. Planning is included in this definition but it is taken to refer to a rather sophisticated notion of planning and acknowledges that plans may change because of the unexpected and that those for whom the curriculum is planned may have a say in planning what will affect them. The notion of a "series of events" distinguishes curriculum planning from lesson or smaller unit planning. The choice of the term "consequences" was not accidental:

> I want to leave room for the planning of events that appear to be educationally fruitful but whose specific consequences for different students might not be known in advance.... these benefits might be delineated in advance in operational terms; others will be general, broad, and diffuse, but in part capable of being recognized subsequent to the activity. (Eisner, 1979, p. 40)

The curriculum by this definition may or may not have a physical existence - it is possible for it to be in the mind of the user. The operational curriculum may be extensive and long term but of a mental sort. The acceptance of this possibility makes it particularly difficult to draw a sharp distinction between curricular and instructional decisions. The desire for strong or weak classification* in definitions

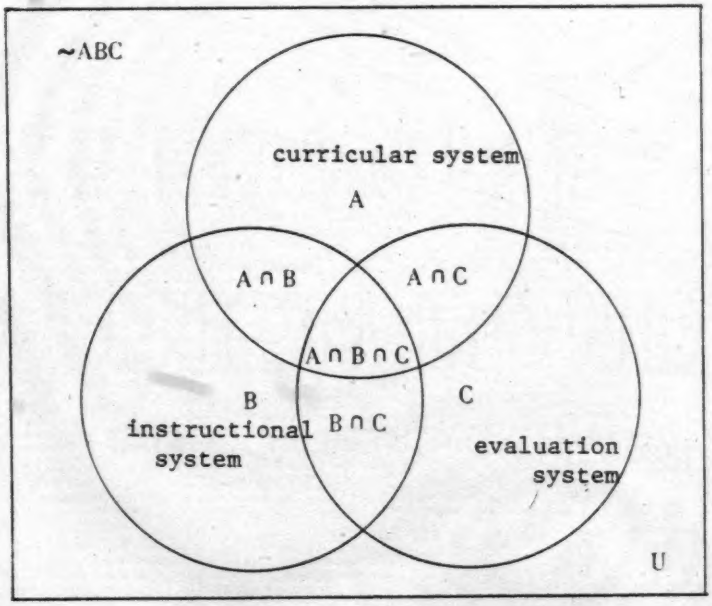
---

*Bernstein (1971) uses the term "classification" to refer to the degree of boundary maintenance between subjects. It is here to indicate the degree of boundary maintenance between curriculum and instruction.

of curriculum/instruction varies. Young (1977 comments:

> ...curriculum is 'a plan outlining the objectives and content of a subject which is available to learners in school.' The important thing to notice about this definition is that it adheres to the viewpoint that there is a difference between curriculum and instruction. (p. 16)

This distinction grew out of Beauchamps (1968) model of schooling, where curriculum strategies were concerned with "what" is taught and instructional strategies with "how" it is taught.



The system was, however, a dynamic one with the parts interacting and implementation was defined as "the penetration of the curricular system into the instructional system" (p. 111). Depending on the curricular domain considered, the overlap can vary in size. When the

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formal curriculum is considered the classification is stronger than when considering the operational curriculum. The teacher works at the interface of curriculum and instruction, and at this point it is difficult to strictly classify decisions as belonging to one realm or another. The distinction is blurred but that is not to suggest that the terms are synonomous. Curriculum has more to do with the "what" and instruction with the "how" but the two realms often interact and influence each other in ways which make the area of intersection deserving of attention. Curriculum research has until recently, concentrated on the preactive dimension and instructional research on the interactive, but the prospect for linkage is evident. MacKay and Oberg (1979) point out, much is to be gained by focusing on the areas of overlap.

> ...the rich and plentiful descriptions of classroom realities from instructional research could provide the much needed grounding for curriculum theorizing in developmental, conceptual-empiricist and reconceptual modes. On the other hand, curriculum theory might provide a unifying framework within which instructional researchers might further examine and understand the results of their studies...the press is upon us to merge the research on teaching with the research on curriculum planning. (p. 14)

Some research (Clark & Yinger, 1977; MacKay & Marland, 1978; McCutcheon, 1979; Zahorik, 1979) is now forthcoming which accepts this challenge and investigates implementation decisions in A ∩ B.

Curriculum Decision Making

Definitions of curriculum decision making reflect the varying conceptions of curriculum. Griffin's (1970) definition involves "a conscious choice...in response to ends-means questions" (p. 18) reflecting the "product" conception of curriculum as compared to the "process" orientation in which decision making occurs in an interactive context and includes conscious and unconscious choices.

Goodlad conceptualized three levels of curricular decisions: societal, institutional and instructional. Several attempts (Goodlad, 1966; Griffin, 1970) have been made to theorize about what decisions are best made at each level. These prescriptive theories have not always been supported by naturalistic studies (Griffin, 1970). There is no doubt about the existence of levels of decision making but the scope or extent of influence of each level fluctuates. We simply do not know very much about the way it is at any level - societal, institutional or instructional and the potential gap between the theoretical and the real is evident. This was a stimulus for this study which inquired into the instructional level decision making actually made by the sample of teachers.

Young (1977) further refined the concept of curriculum decision making by identifying seven kinds of curriculum work around which decision making clustered. The various kinds of work identified could be performed at the societal, institutional, or instructional level and were identified as:

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- Organizing a total program...establishing the framework within which components can function.
- Selecting a 'ready made' curriculum for a subject.
- Adapting a 'ready made' curriculum for a subject.
- Creating a curriculum for a subject.
- Translating a curriculum into instruction.
- Winning support for a new curriculum.
- Evaluating curriculum decision making. (p. 18)

Young (1977) also includes specific decisions related to each area. Three of these areas are of particular importance to this study and will therefore be examined in greater detail.

Specific decisions related to the translation of a curriculum into instruction are:

- Recognizing the purpose of a particular curriculum.
- Selecting methods of teaching which are consistent with that purpose.
- Planning a variety of experiences through which students can learn the basic ideas or skills outlined in the curriculum.
- Selecting or creating appropriate instructional materials.
- Organizing units of study. (pp. 23, 24)

Specific decisions related to the adaptation of a curriculum are:

Determining when a 'ready made' curriculum needs to be changed.

Deciding how the curriculum can be changed without defeating the intent of the curriculum

writers.

- Stressing certain goals over others.
- Revising sequence.
- Accommodating different kinds of learners.
- Designing alternative teaching methods and materials. (p. 24)

Specific decisions related to the creation of a curriculum focus on the question 'What shall be taught?'.

- Clarifying what the subject can do for students.
- Assessing the contribution that various fields of study can make to the subject.
- Selecting basic ideas or skills from those fields of study.
- Sequencing the introduction of the ideas or skills.
- Choosing themes or topics through which the ideas or skills can be developed. (p. 23)

The Teacher as Curricular Decision Maker

Curriculum theorists (Beauchamp, 1968; Krug, 1957; Goodlad, 1979) have identified the teacher as a critical component in curriculum planning and decision making and Herrick goes as far as defining teaching as "curriculum decision making" (McLune, 1970, p. 7).

When the trend is to a centralized model of curriculum development, attempts are made to restrict the teachers' decision making freedom. When the trend is to decentralization, many institutional as well as instructional decisions are included in the teachers' role. In each case the freedom that a teacher may have as a curriculum decision maker is constricted or broadened by the nature and type of

institutional and societal level decisions. At times the teachers' role is affected by decisions that are not made. Because other levels may abdicate responsibilities that are generally described as theirs, the teacher "wins" the responsibility by default.

The teachers' role in curriculum planning is acknowledged as critical by many others as well (Leese, Frasure & Johnson, 1961; Frazier, 1967; Doll, 1978; Oliver, 1965). Of all the people who may make curricular decisions, teachers are closest to the pupil and their needs.

Tanner and Tanner (1975) stress that the issue of teacher involvement in curriculum development is closely linked with the issue of professionalism:

> Those who do not believe that teachers should be so involved tend to look upon teachers as technicians rather than professionals. What is often obscured in the argument is that teachers <u>are</u> engaged in curriculum development. They make crucial decisions on what is to be taught and how it is to be taught.... The problem then becomes one of <u>how</u> teachers may be helped to make better decisions rather than whether teachers should make decisions. (p. 580)

Teacher involvement in curriculum decision making is seen as both inevitable and desirable. As Eisner (1979) suggests, teachers inevitably have a range of options they can exercise in selection, emphasis and timing of curricular events. However the contention is that teachers need consultative help in order to carry out their responsibilities; they need criteria for making curricular decisions:

> ...in the 1950's...In a very real sense the teacher as a curriculum developer stood alone. This continues to be the case in the vast majority of our school districts today...Such classrooms are desert islands with the teachers castaways. Like Robinson Crusoe they must fall back upon their own resources. However, whereas no one ever blamed Robinson Crusoe for not being more creative, the castaway teacher is continually under fire for being "traditional" instead of "forward looking" and for failing to produce spectacular new curriculum designs. In truth his (or her) main concern may be educational and/or physical survival. (Tanner & Tanner, 1975, p. 579)

Olson (1978) found that Canadian science teachers thought curriculum development on the part of teachers was important but few were actively doing it. Teachers were found to react favorably to centralization of control:

> A desire not to have the specifics of instruction mandated appears to be rather general.... At the same time they (teachers) favor the same material being taught to similar groups of students with common examination. Most of our respondents said that common topics should be the basis for the teaching of a subject in any given year and did not want to work independently of other teachers of the grade, nor examine individually. (p. 35)

The teachers were found to be not willingly spending time on wide ranging curricular matters:

> But any general impression of teacher willingness to shape curriculum, even in broad terms, was missing from our data.... Although curriculum development is a shared function, teachers currently are non participants and do not appear anxious to change. (Olson, 1978, p. 39)

Shavelson (1973) asserts that although decision making is the basic teaching skill, it receives little attention in teacher education.

Walker (1980) proposes that teachers make their decisions from a "platform." Similarly, McFarland (1975) contends that as teachers seek to answer the question "Why is this course offered?" they develop a basic rationale or platform from which classroom decisions are made:

> Rationale forces the teacher into direct confrontation with basic decisions about curricular objectives, implementation and evaluation. (McFarland, 1975, p. 74)

Studies of classrooms have revealed several dimensions of teacher decision making. Poll (1970) reports evidence which suggests textbooks, even though they rapidly become outdated and tend to perpetuate existing curriculum rather than encourage change, are more heavily relied on by teachers making curricular decisions than are curriculum guides. Gallagher (1970) found that teachers "adapt" rather than "adopt" innovative practices.

> ...there is no new biology but rather several curricula depending on the idiosyncratic decisions teachers make in implementing the program.... The teacher-proof curriculum appears to be an illusive ideal. (Doyle & Ponder, 1977, p. 1)

Herron (1971) and Sabar and Ariav (1980) report that the lack of congruence between teachers' and developers' goal priority is one of the main reasons new curricula fail to achieve the expected changes as set forth in objectives. In any new curriculum it seems that the

hope for a "Royal Road to Learning" is not realized and instead teachers opt for chosen "foot paths" (Walker & Schassarzic, 1974).

In the end, decisions that are made at other levels are filtered through teachers making them a very important participant in the decision making process. As Routledge and Kegan (1979) suggest, it is them "on whom the toll falls" (p. 3).

CHAPTER III

DESIGN OF THE STUDY

In this chapter the research procedures are described and the methods of investigation employed are outlined.

Research Method

The research approach considered most suitable was a descriptive method characterized by Leedy (1974) as:

> Survey Research: Observation with Insight.... The method of research that simply looks with intense accuracy at the phenomena of the moment and then describes precisely what the researcher sees. (p. 79)

The research was designed to be exploratory as there is little information available on what role the teacher actually plays in constructing the curriculum. There is, however, considerable evidence of the critical nature of this role. Fox (1969) proposes:

> ...in education research there are two conditions which occurring together suggest and justify the descriptive survey: First that there is an absence of information about a problem of educational significance and second, that the situations which could generate that information do exist and are accessible to the researcher. (p. 424)

In order to gather data that would contribute to the understanding of the phenomena, two "observation" techniques were used: a survey questionnaire and an interview schedule. It was felt that these two techniques would complement each other and serve the purpose of the study. As Ryan (1977) states, each technique has advantages and dis-

advantages over the other:

> Advantages of the Questionnaire
> ...The privacy of the mail questionnaire lessens the societal and personal stresses which may force the respondent to attempt to preserve his or her self esteem in conflict situations by giving false information.
>
> Advantages of the Structured Interview
> An interviewer is on hand to clear up any misunderstanding or confusion in the mind of the respondent concerning what response is required of him or her.... An interviewer can become attuned to cues which might indicate further areas of fruitful probing. (p. 49)

Used together, it was felt that the study would benefit from the advantages of each methodology. The study relied primarily on the questionnaire and to a lesser extent on the structured interview.

The Questionnaire

The purpose of the questionnaire. The questionnaire was designed in two parts. Part I (Appendix A) was used to gather biodata - information on the teachers and their teaching situation so that the sample could be adequately described. This data was also used to place the sample into subgroups within four population variables:

1. Size of school - small (1 Chemistry 20 teacher)
   - large (2 or more Chemistry 20 teachers)
2. Core reference used - Keys to Chemistry
   - ALCHEM 20
3. Years of Education - 4 or less

- 5 or more

4. Years of Chemistry Teaching Experience - 10 or less

- 11 or more

Part II (Appendix A) was used to gather information on the nature and scope of the teachers' curriculum decision making. The items evolved from the research questions posed for the study. Items 4, 7 and 9 inquired into specific dimensions of decision making related to curriculum implementation. Items 1, 2 and 10 dealt with decisions made in adapting the core portion of the program. Items 5, 6 and 3 examined the selection, adaptations and creation of elective curriculum and item 8 dealt with all three of these areas of decision making.

The development of the questionnaire. In designing the questionnaire the researcher relied on personal experience, writings on curriculum decision making and the opinions of others with knowledge of the area. The literature on constructing valid and reliable questionnaires (Parry & Crossly, 1950; Helmstadler, 1970; Mouly, 1970; Leedy, 1974) was reviewed and care taken that the questionnaire fulfilled the research objectives of the study, i.e. that a) the items measured what they were supposed to measure and b) that the responses would be as truthful and accurate as possible within the limitations of the study design. In preparing the questionnaire, several relevant factors (McLune, 1970, p. 99) were kept in mind:

1. Time required to complete - Teachers are busy with tasks directly related to their teaching. It was hoped that if the need

for, and purpose of, their involvement with the study was made clear and that if the time required to complete the questionnaire was kept to a minimum (about 20 minutes), teachers would be willing to participate in the research.

2. Ease of completion - The questionnaire sought information that the teachers had readily available and information that could be given in as brief a form as possible (i.e. check lists, Likert items, etc.).

3. Clarity of directions and nature of data requested - The teachers should clearly understand what was requested and be aware that the purpose of the study was to identify their practices and not to evaluate, rate or judge them on their responses.

In light of these developmental considerations, an initial draft of the questionnaire was prepared. This was scrutinized by three University professors acting as judges of the face validity of the questionnaire. They concluded that the instrument possessed such validity but made suggestions for minor modifications in order to overcome some ambiguity of terminology and increase the ease of response to some items.

Piloting the questionnaire. A subsequent draft of the questionnaire was piloted by five Chemistry 20 teachers in the vicinity of Edmonton. They were asked to complete the questionnaire and in addition, to comment on difficulties they experienced in understanding or responding to any of the items. As a result of this feedback and

an analysis of the pilot teachers responses, one item was deleted because the pilot group found it very complicated and time consuming. Two other items were modified to allow them to gather the vital data which would have been previously gathered by the deleted item. The number of choices on two of the items were increased to include responses the pilot teachers felt would be their choice if available.

The Interview

The purpose of the interview. The interview schedule was designed to augment the data collected in the survey questionnaire. It was hoped that the face to face contact and the opportunity to pose more open ended questions would allow for greater revelation of the "whys" behind the "what" related decisions.

The development of the interview format. The three potential interview formats considered were: 1) the scheduled standardized interview, in which item order and wording is uniform in all interviews; 2) the non-scheduled standardized interview in which order and wording of items are not fixed but the interviewer works from a set list of items; and 3) a nonstandardized interview in which questions posed "flow from the interviewer's grasp of the total study" (Pylypiw, 1974, p. 44).

Because of the role of the interview in this study, it was felt that a combination of the latter two formats would be the most useful. The

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nonscheduled standardized format would provide some structure and the incorporation of a large nonstandardized dimension would allow for probing and/or digression from format when desirable.

The interview outline then evolved (Appendix A), based on the research questions of the study and the interview considerations reported in the literature (Adams, 1958; Institute for Social Research, 1969; Richardson, Dohrenwend, Klien, 1965) as factors contributing to the quality of an interview.

The Selection of the Sample

Schools containing high school grades (not necessarily exclusively) and within an approximate 60 mile radius of Edmonton were identified from a list of Operating Schools in Alberta: School Year 1980-81 (Alberta Education). The decision was made to restrict the study population geographically to allow the researcher personal contact with the study participants within reasonable time and financial constraints. The personal contact was required for the interviews and thought to be desirable in enhancing a complete return of the questionnaires.

A letter (Appendix B) was sent out to the superintendents of the jurisdictions in which the schools were located. It requested permission to ask the Chemistry 20 teachers in their schools if they would be willing to participate in the study. Permission was requested and given from 17 jurisdictions (Appendix B).

Three out of every four schools on the list were selected as the location of the Chemistry 20 teachers to receive a questionnaire. There was a total of seventy Chemistry 20 teachers in these schools, all of whom were asked to complete a questionnaire. Three teachers were selected from the remaining schools to form the interview sample and provide a second discrete data source. They were selected so that there was representation from large schools (2 teachers) and small schools (1 teacher); those using ALCHEM 20 as their core reference(2 teachers) and those using Keys to Chemistry (1 teacher). A more detailed description of the teachers in the questionnaire sample and the three teachers interviewed is included in Chapter IV.

Data Collection Procedures

Administering and collecting the questionnaire. A cover letter requesting teacher participation (Appendix B) was prepared. It briefly outlined the focus of the study and assured the teachers anonymity of response. Visits were made to the schools in which the potential respondents were located. In the large urban schools a meeting was held with the department head and his cooperation obtained. Sufficient questionnaires were left with him to distribute to each of the Chemistry 20 teachers in his school. The department head agreed to collect the completed returns in their sealed envelopes. The researcher returned one week later to collect the returns from him. Visits were also made to sixteen of the schools outside of the

city. In these schools the researcher met the Chemistry 20 teacher(s) personally and left questionnaires to be returned by mail in the accompanying self-addressed stamped envelope. Time constraints prevented all of the questionnaires from being delivered and as a result 19 questionnaires were mailed directly to the Chemistry 20 teachers in schools outside the city. Enclosed was a self-addressed stamped envelope for the return of the completed form. Of the 70 questionnaires sent out, 85.7% were completed and returned. The questionnaires were numbered so that a reminder letter (Appendix B) could be sent to those not returning the questionnaire within three weeks of receiving it. The researcher received one more return after this contact making the percentage of questionnaire return 87.1%. This was considered a very good return rate higher than is normally anticipated and consistent with the "at least 80-90%" which Kerlinger (1964) advocates as the figure about which the "non returns" have little or no effect on the validity of the findings.

Arranging and conducting the interview. Telephone contact was made with the potential interviewees to make them aware of the intent of the study and to determine their willingness to participate. A time suitable for the interview was arranged. The interviews were conducted during the school day with teachers offering to give up their preparation or lunch time.

Preceding the interview itself, time was taken for introductions and an attempt made to establish a favorable rapport. The interviewee

selected the in-school site for interview. Every attempt was made to have the atmosphere and setting of the interview one in which the teacher was comfortable. Individuals were assured they would remain anonymous and that answers to the questions were of interest in so far as they provided information on "existing" decision making. There were no right or wrong responses to any of the items. The interview was of approximately 30 minutes duration. Field notes were taken during the interview and written up by the researcher immediately following each interview.

Treatment of the Data

As Leedy (1974) says of the descriptive survey approach:

> The researcher describes what he has observed. If he employs statistics...he relies upon those statistical approaches that we usually consider as belonging to the province of descriptive statistics.... Descriptive studies deal with questionnaire data, interview data, and simple observational information.... We may characterize the inner quality of the data in the descriptive or normative survey, therefore, as either being verbal or quasi verbal in character. (p. 114)

Analysis of the questionnaire. The results of Part I were used to describe the sample and form the subgroups used in analyzing for variation in teacher decision making. The independent variables identified were examined for interrelationships using the non-parametric, chi square statistic. Parametric statistics were not suitable for questionnaire analyses because the required assumption

of normally distributed populations and variance were not present in this study.

The results of Part II were used to determine the nature and extent of the teacher's role in curriculum implementation, adaptation and creation. Secondly the results were examined to see if these decisions varied with the independent variables selected. Inspection and frequency counts were used to analyze the data. Table format was used to present the summary of responses to each question. Statistical tests of significance were not used because the sample was small (cell frequencies were often less than five), and the intent of the study was to explore and describe a phenomenon--the teacher's actual role in curriculum decision making--about which too little is currently known to generate initial hypotheses.

Presentation of interview information. The interview data is presented in written form to enrich the data gathered from the questionnaires. The teachers' perception of their decision making is reported and examined in light of their individual situations. The sample is small and although drawn from the same population as the questionnaire sample the data is used to augment the questionnaire results not explain them.

Chapter Summary

An outline of the research methodology was described in this chapter. Information was provided on the selection of the sample; the

purpose, development and administration of the instruments used; and the procedures used in the treatment of the data. The results are reported in Chapter IV.

CHAPTER IV

FINDINGS AND DISCUSSION RELATED TO CURRICULUM DECISION MAKING BY THE TEACHER

In this chapter findings from the completed questionnaires and from the interview sessions are reported. The results of the questionnaire are organized around the research questions posed for the study. Data is presented in tabular form and analyzed according to frequency count and trends observed. The interviews are presented as three "mini" case studies in curriculum decision making providing additional descriptive data for discussion.

Questionnaire Respondents

Seventy questionnaires were distributed to Chemistry 20 teachers in Edmonton and vicinity. Sixty-one questionnaires were completed and returned for an 87.1% response.

Results of the Questionnaire: Part I Responses

Part I of the questionnaire was designed to gather information which would be helpful in describing the sample of teachers participating in the study.

Table 1 summarizes the data on the community and school in which the teachers taught. The size of community in which the schools were located ranged from less than 1000 to greater than 100,000 population. Large urban schools were the setting of 50.8% of the

TABLE 1

DESCRIPTION OF COMMUNITY AND SCHOOL

	Number of Teachers	% of Respondents
Population of Community		
less than 1,000	15	24.6
1000 - 4999	7	11.5
5000 - 29 999	7	11.0
30 000 - 99 999	1	1.6
100 000 or more	31	50.8
Total	61	100.0
Type of School		
elementary to senior high	12	19.7
junior and senior high	10	16.4
senior high	39	63.9
Total	61	100.0
Full time Teachers on Staff		
1 - 9	2	3.3
10 - 24	17	27.9
25 - 39	11	18.0
40 or more	31	50.8
Total	61	100.0
Chemistry 20 Teachers in School		
1	25	41.0
2 - 3	21	34.4
4 - 5	13	21.3
6 or more	2	3.3
Total	61	100.0

teachers in the sample. Schools of various types were represented; 19.7% contained elementary to senior high grades, 16.4% were junior-senior highs and 63.9% were exclusively senior high schools. The schools varied in size from those having less than 10 full time teachers, including one Chemistry 20 teacher, to large schools with 40 or more teachers, including up to 6 Chemistry 20 teachers. Of the teachers in the sample, 41.0% were the only teachers in their school teaching Chemistry 20 and 59.0% had at least one other colleague also teaching Chemistry 20.

Table 2 describes the professional background, education and experience, of the sample. The median value of years of University education of the sample was 5 years. All but one of the teachers had at least one degree. Of the thirty one teachers reporting a single degree, one had a B.A., fourteen had a B.Sc. and sixteen had a B.Ed. Those with two Bachelor degrees comprised 34.4% of the sample and 13.1% had completed a Masters degree or Ph.D..

Of the participating teachers, 65.5% had 11 or more years teaching experience and 45.9% of the teachers had taught chemistry for 11 or more years. Five individuals, or 8.2% of the sample, were teaching chemistry for the first year, but of these five teachers only one had no previous teaching experience. The sample was generally a very experienced group of teachers with the median of total teaching experience in the interval of 11 - 15 years and the median of chemistry teaching experience between 6 and 10 years.

TABLE 2

DESCRIPTION OF TEACHER EDUCATION AND EXPERIENCE

	Number of Teachers	% of Respondents
Years of University Education		
2 or less	0	0.0
3 or 4	24	39.3
5	22	36.1
6 or more	15	24.6
Total	61	100.0
Degrees Obtained		
none	1	1.6
single degree	31	50.8
B.Ed. (16)		
B.Sc. (14)		
B.A. (1)		
two Bachelor degrees	21	34.4
Masters degree or Ph.D.	8	13.1
Total	61	100.0
Total Years of Teaching Experience		
1 or less	1	1.6
2 - 5	8	13.1
6 - 10	12	19.7
11 - 15	21	34.4
16 or more	19	31.1
Total	61	100.0
Years of Chemistry Teaching Experience		
1 or less	5	8.2
2 to 5	12	19.7
6 to 10	16	26.2
11 or more	28	45.9
Total	61	100.0

Table 3 summarizes the information on the extent the teacher is involved in Chemistry 20 teaching and the prescribed core textbook used. ALCHEM 20 was the core reference used by 65.6% of the teachers and 4.9% more were using it for more than 70% of their core program. Therefore, 70.5% of the sample was considered to be using ALCHEM 20 as their core reference. Keys to Chemistry was the reference used by 19.7% of the teachers and 6.5% more were using it for more than 70% of their core program. Therefore, 26.2% were considered to be using Keys to Chemistry as their core reference. Two individuals, or 3.3% of the sample, reported using both of the prescribed core references equally.

All but 5% of the teachers were involved in teaching subjects other than Chemistry 20. Chemistry 20 comprised less than forty percent of the teaching load of 88.3% of the sample. The teachers were generally involved in teaching one or more other science courses, 17.2% were also teaching a mathematics course and 17.2% had included in their teaching load one or more courses not considered to be mathematics or science.

Data from Part I of the questionnaire was also used to form subgroupings of the teachers participating in the study. Four independent variables were identified: 1) the number of Chemistry 20 teachers in the school, 2) the prescribed core reference adopted, 3) the teachers' years of education, and 4) years of chemistry teaching experience. These characteristics were identified as those demographic variables

TABLE 3

DESCRIPTION OF TEACHING SITUATION AND CORE TEXT

	Number of Teachers	% of Respondents
Core Reference adopted		
Keys to Chemistry	12	19.7
ALCHEM 20	40	65.6
both of the above		
more than 70% Keys to Chemistry	4	6.5
more than 70% ALCHEM 20	3	4.9
50% Keys to Chemistry-50% ALCHEM 20	2	3.3
Total	61	100.0
Percentage of Teaching Load that is Chemistry 20		
20% or less	29	48.3
21% - 40%	24	40.0
41% - 60%	3	5.0
61% - 80%	1	1.7
80% or more	3	5.0
Total	60 *	100.0
Other Classes Taught		
Only Chemistry 20	3	5.2
Other chemistry courses	6	10.3
Chemistry and one other science	21	36.2
Chemistry and two other sciences	8	13.8
Sciences and mathematics	10	17.2
Sciences and one non science or mathematics course	10	17.2
Total	58 *	100.0

* totals other than 61 indicate incomplete response

appearing most likely to be related to the teacher's role in curriculum decision making in light of: a) the review of the literature in curriculum decision making and b) the researcher's background and experience. The latter three variables are self-explanatory. However, the first variable, the number of Chemistry 20 teachers in the school may need further description. It is closely related to size of school, i.e. the large high schools had 2 or more Chemistry 20 teachers and to size of community, i.e. those schools with more than one chemistry teacher tended to be those in the larger communities.

Two cells were formed for each variable. This involved some collapsing of cells from the original questionnaire items to eliminate very low frequencies in some cells. Table 4 summarizes the data on the independent variables used in this study for an examination of relationships between sub-groups and certain curricular decisions made by teachers.

The four independent variables were examined to see to what if any extent they overlapped or were related to each other. Null hypothesis were stated and Chi square test of independence was calculated. Tables 5, 6 and 7 indicate that the variables were not related with the exception of teacher's years of education and years of chemistry teaching experience. Respondents who had 11 or more years of chemistry teaching experience were more likely to have 5 or more years of university education than those with 10 or less years of experience.

TABLE 4

THE FOUR INDEPENDENT VARIABLES

Variable	Description of Cells	Frequency of Respondents
Size of Chemistry 20 teaching staff	one teacher	25
	two or more teachers	36
	Total	61
Prescribed core reference adopted	Keys to Chemistry (1977)	16
	ALCHEM 20 (1977)	43
	Total	59 *
Teacher's years of education	4 or less	24
	5 or more	37
	Total	61
Years of chemistry teaching experience	10 or less	33
	11 or more	28
	Total	61

* Two respondents were using the two prescribed references equally.

TABLE 5

RELATIONSHIP BETWEEN NUMBER OF CHEMISTRY 20 TEACHERS IN THE SCHOOL AND THREE OTHER VARIABLES

Prescribed Core Test Adopted

Size of Chemistry 20 Staff	Keys to Chemistry	ALCHEM 20	
1	7	17	24
2+	9	26	35
	16	43	59

Ho: There is no relationship between the number of Chemistry 20 teachers in the school and the core reference adopted

.05 $\chi_1^2 = 3.85$

observed = .09

∴ Ho is not rejected

Teachers Years of Education

Size of Chemistry 20 Staff	4 or less	5 or more	
1	10	15	25
2+	14	22	36
	24	37	61

Ho: There is no relationship between the number of Chemistry 20 teachers in the school and teachers years of education

observed $\chi_1^2 = .01$

∴ Ho is not rejected

(continued)

Table 5 ... continued

	Years of Chemistry Teaching Experience		
	10 or less	11 or more	
Size of Chemistry 20 Staff 1	13	12	25
2+	20	16	36
	33	28	61

Ho: There is no relationship between the number of Chemistry 20 teachers in the school and years of chemistry teaching experience

observed $\chi^2_1 = .08$

$\therefore$ Ho is not rejected

TABLE 6

RELATIONSHIP BETWEEN ADOPTED CORE REFERENCE AND TWO OTHER VARIABLES

Teachers Years of Education

		4 or less	5 or more	
	Keys to Chemistry	4	12	16
Core Reference Adopted	ALCHEM 20	19	24	43
		23	36	59

Ho: There is no relationship between the core reference adopted and the teachers years of education

$.05\ \chi^2_1 = 3.85$

observed = 1.80

∴ Ho is not rejected

Years of Teaching Experience

		10 or less	11 or more	
	Keys to Chemistry	6	10	16
Core Reference Adopted	ALCHEM 20	26	17	43
		33	27	59

Ho: There is no relationship between the core reference adopted and the years of teaching experience

observed $\chi^2_1 = 2.48$

∴ Ho is not rejected

TABLE 7

RELATIONSHIP BETWEEN TEACHER'S YEARS OF EDUCATION AND YEARS OF CHEMISTRY TEACHING EXPERIENCE

		Years of Chemistry Teaching Experience		
		10 or less	11 or more	
Teacher's Years of Education	4 or less	18	6	24
	5 or more	15	22	37
		33	28	61

Ho: There is no relationship between teacher's years of education and years of chemistry teaching experience

$.05\ \chi^2_1 = 3.85$

observed = 6.96

$\therefore$ Ho is rejected

48

Results of the Questionnaire: Part II Responses

Part II of the questionnaire gathered data on the teacher's role in curriculum decision making. The findings of the questionnaire items are clustered about the specific area of decision making they investigated: curriculum implementation, adaptation and creation. In the first stage of analysis of the data the decisions made by the total number of respondents were examined. In the second stage of analysis the data was examined to see if specific decisions varied with any of the four independent variables. This data was not subjected to statistical analyses but was examined for trends and points of central tendency in a manner consistent with the purpose of the study.

Curriculum implementation decisions. Functioning at the interface of curriculum and instruction, teachers make decisions as they "enact" the perceived formal curriculum. These decisions may be influenced by what or whom the teachers rely on as they carry out the translation of the received curriculum into an operational one. Items 4, 7, 8 and 9 inquired into specific dimensions of this decision making related to curriculum implementation.

Item 4

Information was gathered as to which sources of input teachers considered most important when making decisions about how they are going to implement the curriculum. Each possible source of input was rated on a scale of 1 (not important) to 4 (very important). A summary of the data is found in Table 8 (see Appendix D for response distri-

TABLE 8

RELATIVE IMPORTANCE OF POSSIBLE SOURCES OF INPUT TO TEACHERS

Rating Scale:
(1) of no importance
(2) of little importance
(3) important
(4) very important

Source of Input	Mean Rating
Selected textbooks and teachers manuals	3.5
Laboratory materials and workbooks	3.4
Personal experiences and interests	3.3
Discussion and input from colleagues	3.1
Supplementary books and A.V. materials	3.0
Formal professional development courses	2.8
Students' experiences and interests	2.7
Provincial curriculum guides	2.7
In-service workshops	2.6
Professional associations or councils	2.5
Periodicals and newspapers	2.4
Opinions of parents, community groups, etc.	2.0
Curriculum consultants	1.9

bution). A mean value, indicating the relative importance of each possible source of input to the sample, was calculated and these sources were then arranged in decreasing order of importance.

The means of the first group are 3.0 or above and indicate that the sample found these five sources to be important to very important to them. The sources in this group tended to be of two varieties, textual materials and experiences of teachers and/or colleagues.

The means of the second group of possible sources of input are between 2.0 and 2.9. This would indicate that the sample considered them to be of moderate importance. With the exception of "students' experiences and interests" these resources are more "distant" from the classroom. They are less "directly usable," in that they require more teacher input or integration, than the textual materials appearing in the first group.

Input from out-of-school personnel: parents, community groups and curriculum consultants, was considered by the sample to be of little or no importance.

The data was further analyzed to see if the importance of various possible sources of input into curriculum implementation decisions varied with the four independent variables. Table 9 indicates that the teachers' relative order of importance of sources of input did not vary greatly with category. There were only minor deviations between some categories and from the responses of the sample as a whole. In only two instances did the differences between the mean rating of the

TABLE 9

RELATIONSHIP OF IMPORTANCE OF POSSIBLE SOURCES OF INPUT TO CATEGORIES OF TEACHERS

	Teachers Years of Education		Years of Chemistry Teaching Experience		Size of Chemistry 20 Staff		Adopted Core Reference	
	4 or less	5 or more	10 or less	11 or more	One	Two of More	Keys to Chemistry	ALCHEM 20
Selected textbooks and teachers manuals	3.6	3.4	3.4	3.6	3.3	3.7	3.6	3.5
Laboratory materials and work books	3.6	3.3	3.5	3.3	3.5	3.4	3.5	3.4
Personal experiences and interests	3.1	3.4	3.2	3.4	3.2	3.3	3.4	3.2
Discussion and input from colleagues	3.1	3.1	3.1	3.1	2.8	3.4	3.1	3.1
Supplementary books and A.V. Materials	2.8	3.1	2.9	3.1	2.9	3.1	3.0	3.0
Formal professional development courses	2.6	2.9	2.8	2.8	2.7	2.8	2.8	2.8
Students' experiences and interests	2.7	2.7	2.7	2.7	2.7	2.7	2.6	2.7
Provincial curriculum guides	2.8	2.7	2.7	2.7	2.7	2.7	2.8	2.7
In-service workshops	2.5	2.6	2.5	2.7	2.8	2.3	2.6	2.5
Professional associations or councils	2.4	2.5	2.4	2.6	2.6	2.3	2.4	2.5
Periodicals and newspapers	2.3	2.5	2.4	2.5	2.5	2.4	2.4	2.4
Opinions of parents community groups etc.	1.9	2.0	2.0	1.9	2.1	1.9	2.1	2.0
Curriculum consultants	2.1	1.8	2.0	1.8	1.9	1.9	1.9	1.9

subgroups differ by 0.5 or more. When teachers had no colleagues also teaching Chemistry 20, they predictably valued colleague input less than did others. Conversely they valued inservice workshops and professional association input more than did others.

Item 9

Inquiry was made as to how autonomous the sample of teachers felt in their decision making. Results are summarized in Table 10. Each cell contains the frequency and percentage of the respondents choosing that response. If teachers did not make the decision alone, they may have consulted or received permission from more than one other source, therefore the percentages do not total 100%.

About two thirds of the teachers made the decision alone to add materials to the core portion of the program, or altered time allotments on prescribed units of study. The remaining one third of the teachers consulted or received permission from one or more other people or groups within the school on these decision items. About one half of the teachers selected elective goals, topics and material and designed a final evaluation instrument alone.

Colleagues were the group consulted most frequently on all four decision items. This is in agreement with the data from question four (Table 8), in which the sample reported colleagues as an important source of input into curriculum decision making. The department head was next most frequently involved in the teacher's decision making, especially in designing evaluation procedures, where he was consulted

TABLE 10

DEGREE OF AUTONOMY ON SELECTED DECISION MAKING ITEMS

	I make the decision alone	Colleagues	Department head	School administrator	Students	District office staff	Alberta Education staff	Other
add materials to supplement core resources	41 (68%)	13 (22%)	9 (15%)	6 (10%)	5 (8%)	1 (2%)		
alter the time allotment for various prescribed units of study	40 (65%)	17 (28%)	10 (17%)	2 (03%)	6 (10%)	1 (2%)		
select goals, topics and resources for elective portion of program	30 (50%)	18 (30%)	13 (22%)	2 (3%)	5 (8%)	1 (2%)	1 (2%)	1 (2%)
design a final evaluation procedure and examination for students	29 (48%)	24 (40%)	18 (30%)	4 (6%)	3 (5%)	1 (2%)	1 (2%)	

54

by 30% of the sample. Less than 10% of the sample felt they must consult with students or school administrators in any of the four decision making areas. Only a very small percentage (from 2 - 6%) of teachers consult with personnel outside the school (district or provincial).

Item 7

The sample was asked to identify who was currently responsible for measuring final student achievement in their classes and how general an instrument they considered ideal for final evaluation.

Table 11 indicates a summary of the responses. Currently, 45.9% of the sample are using an individual, teacher made final examination. The remaining 54.1% currently have either a common school or a common district examination.

However, of the twenty eight teachers administering their own final examination, only fourteen of them or 23% of the sample consider it ideal. There is currently no provincial exam used in Alberta, but 23% of the sample felt the province would be the ideal evaluator in Chemistry 20 and 4.9% more felt that the province should be partially (see Table 11 footnote) responsible for evaluation.

The data indicates a trend to desire greater centralization of the evaluation responsibility. A further examination of the data (Table 12) revealed that regardless of what level of evaluation teachers are currently using in their classes, 49.1% of the sample would favor a more centralized form of evaluation and 50.9% of the sample are

55

TABLE 11

LOCATION OF RESPONSIBILITY FOR MEASURING FINAL STUDENT ACHIEVEMENT

Choice of Degree of Centralization	Current Frequency (% of sample)	Ideal Frequency (% of sample)
individual teacher	28 (45.9%)	14 (23.0%)
common school-wide	27 (44.3%)	16 (26.2%)
common district	6 (9.8%)	13 (21.3%)
common provincial	n.a.	14 (23.0%)
Total	61	*57

* Four teachers wrote in a combination of evaluators

1/2 teacher, 1/2 province (3 comments)

1/2 teacher, 1/2 district (1 comment)

56

TABLE 12

MEASURE OF CENTRALIZATION TREND

	Frequency (% of sample)
Favour greater centralization than is currently existing	30 (49.1%)
Favour some level of evaluation as is currently used	31 (50.9%)
Favour greater decentralization	0 (0%)
Total	61 (100.0%)

satisfied with the level of evaluation currently used. None of the sample would favor greater decentralization in evaluation procedures.

The data on who is currently or ideally responsible for final evaluation of Chemistry 20 was further analyzed to see if the choices were related to any of the four independent variables. Table 13 and Table 14 provide a summary of the findings. Each cell contains the frequency and percentage of respondents making the selection in each category. Figures 1 to 16 graphically compare the choices of the subgroups.

The current and desired level of responsibility for evaluation did vary with the number of Chemistry 20 teachers on staff. This is evident in Figures 1 to 4. When a single teacher was responsible for all the Chemistry 20 in a school, the final exam was set by them for their class or classes 100 percent of the time. About one half of these teachers, however, felt that to have an authority outside the school responsible (totally or in part) for the final evaluation would be ideal. When there is more than one person teaching Chemistry 20 the trend is to have a common school wide exam. Only 22.2% of these larger staff teachers gave individual teacher exams and 16.7% were using an evaluation instrument common to their district. Again about one half of these teachers thought it ideal to have an authority outside the school responsible for final evaluation, with 25% favoring a common provincial exam. Only 11.1% of the larger staff teachers felt the most decentralized form of evaluation--the classroom teacher--was ideal.

TABLE 13

RELATIONSHIP OF TWO VARIABLES TO CURRENT AND IDEAL EVALUATION RESPONSIBILITY

	SIZE OF CHEMISTRY 20 STAFF				ADOPTED CORE REFERENCE			
	One		Two or More		Keys to Chemistry		ALCHEM 20	
LEVEL of Evaluation	Current	Ideal	Current	Ideal	Current	Ideal	Current	Ideal
Individual Teacher	20 (80.0%)	10 (40.0%)	8 22.2%	4 (11.1%)	10 (62.5%)	5 (31.3%)	17 (39.5%)	8 (18.6%)
Common School-wide Exam	5 (20.0%)	3 (12.0%)	22 (61.1%)	13 (36.1%)	5 (31.3%)	4 (25.0%)	21 (48.8%)	12 (27.9%)
Common District Exam	0	4 (16.0%)	6 (16.7%)	9 (25.0%)	1 (6.2%)	1 (6.2%)	5 (11.6%)	11 (25.6%)
Common Provincial	n/a	5 (20.0%)	n/a	9 (25.0%)	n/a	6 (37.5%)	n/a	8 (18.6%)
Other (Shared Responsibility)	0	3 (12.0%)	0	1 (2.8%)	0	0	0	4 (9.3%)
TOTAL	25	25	36	36	16	16	43	43
DESIRED TREND								
Greater Centralization	17 (47.2%)		13 (52.0%)		9 (56.3%)		20 (46.5%)	
Same Degree of Centralization	19 (52.7%)		12 (48.0%)		7 (43.7%)		23 (53.5%)	
Greater Decentralization	0		0		0		0	

TABLE 14

RELATIONSHIP OF OTHER VARIABLES TO CURRENT AND IDEAL EVALUATION RESPONSIBILITY

LEVEL OF EVALUATION	TEACHERS YEARS OF EDUCATION				YEARS OF CHEMISTRY TEACHING EXPERIENCE			
	4 or less		5 or more		10 or less		11 or more	
	Current	Ideal	Current	Ideal	Current	Ideal	Current	Ideal
Individual Teacher	11 (45.8%)	5 (20.8%)	17 (45.9%)	9 (24.3%)	17 (51.5%)	8 (24.2%)	11 (39.3%)	6 (21.4%)
Common School-Wide Exam	11 (45.8%)	6 (25.0%)	16 (43.2%)	10 (27.0%)	14 (42.4%)	6 (18.2%)	13 (46.4%)	10 (35.7%)
Common District Exam	2 (8.4%)	7 (29.2%)	4 (10.8%)	6 (16.2%)	2 (6.1%)	11 (33.3%)	4 (14.3%)	2 (7.1%)
Common Provincial Exam	n/a	5 (20.8%)	n/a	9 (24.3%)	n/a	7 (21.2%)	n/a	7 (25.0%)
Other (Shared responsibility)	0	1 (4.2%)	0	3 (8.1%)	0	1 (3.0%)	0	3 (10.7%)
TOTAL	24	24	37	37	33	33	28	28
Desired Trend								
Greater Centralization	13 (54.2%)		17 (45.9%)		18 (54.5%)		12 (42.9%)	
Same degree of Centralization	11 (45.8%)		20 (54.1%)		15 (45.5%)		16 (57.1%)	
Greater Decentralization	0		0		0		0	

FIGURE 1.
Current Student Evaluators with "Lone" Chemistry 20 Teachers.

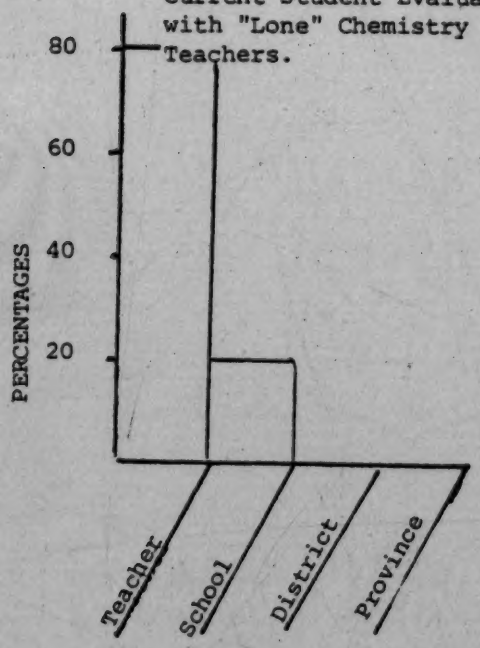


FIGURE 2.
Current Student Evaluators with Larger Staff Teacher

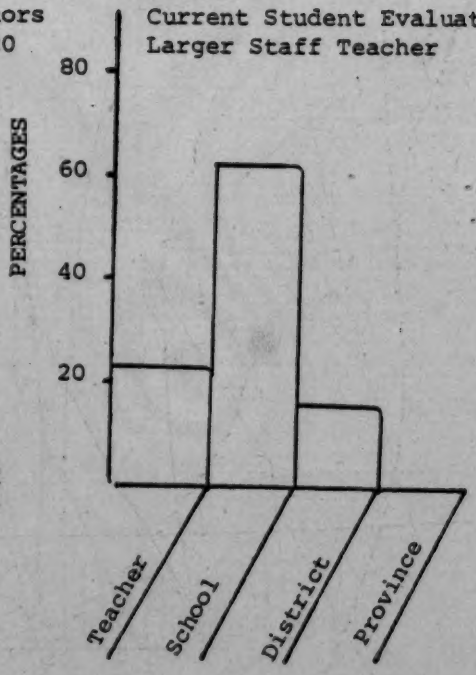


FIGURE 3.
Ideal Student Evaluators with Lone Chemistry 20 Teachers.

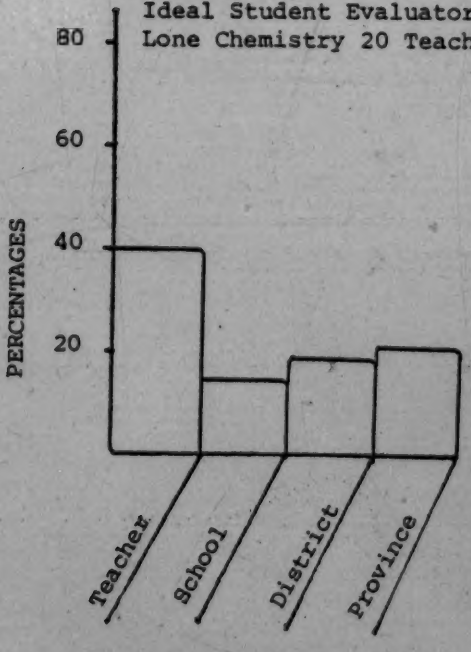


FIGURE 4.
Ideal Student Evaluators with Larger Staff Teachers.

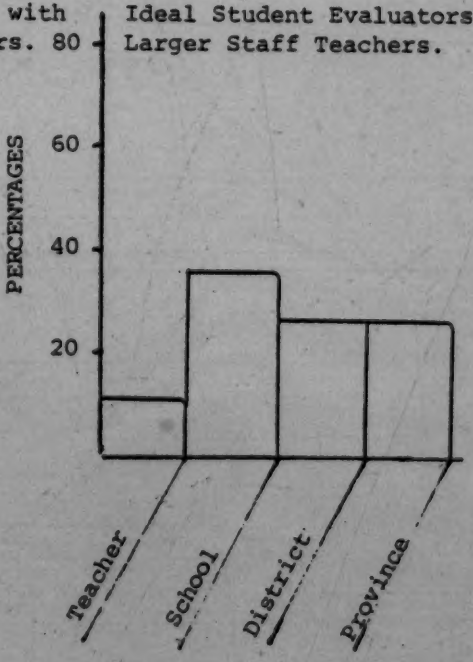


Figure 5.
Current Student Evaluators with Keys to Chemistry Teachers.

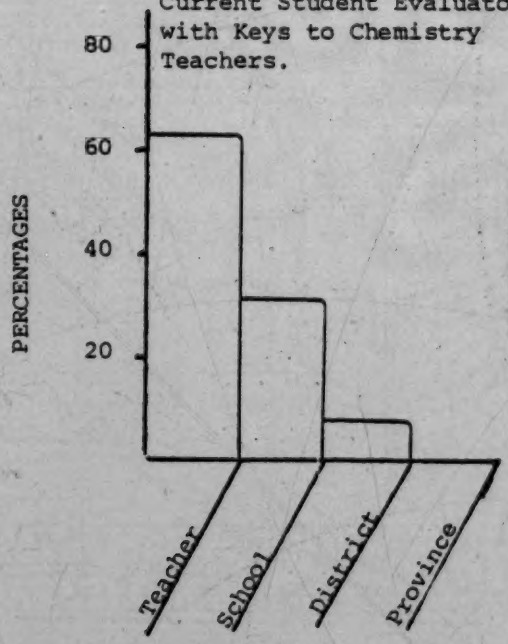


Figure 6
Current Student Evaluators with ALCHEM 20 Teachers.

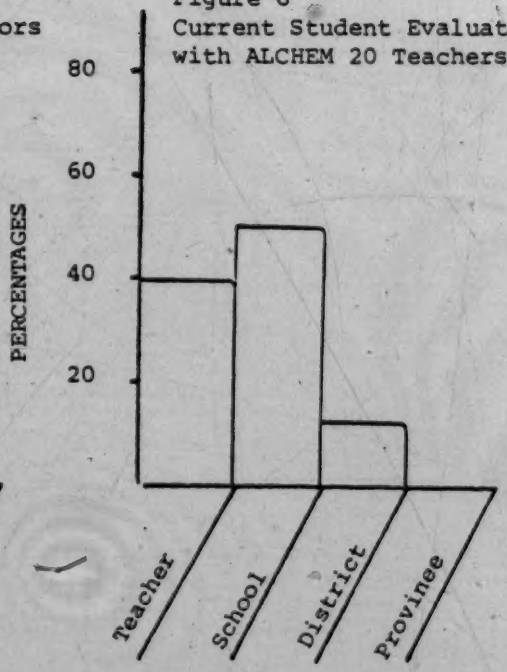


Figure 7.
Ideal Student Evaluators with Keys to Chemistry Teachers

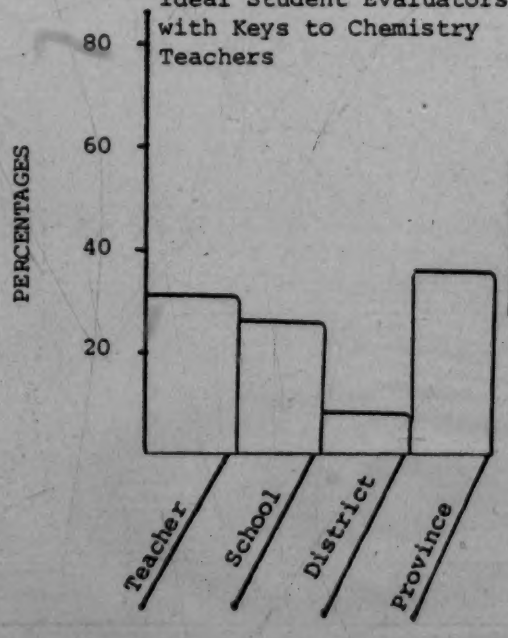


Figure 8.
Ideal Student Evaluators with ALCHEM 20 Teachers.

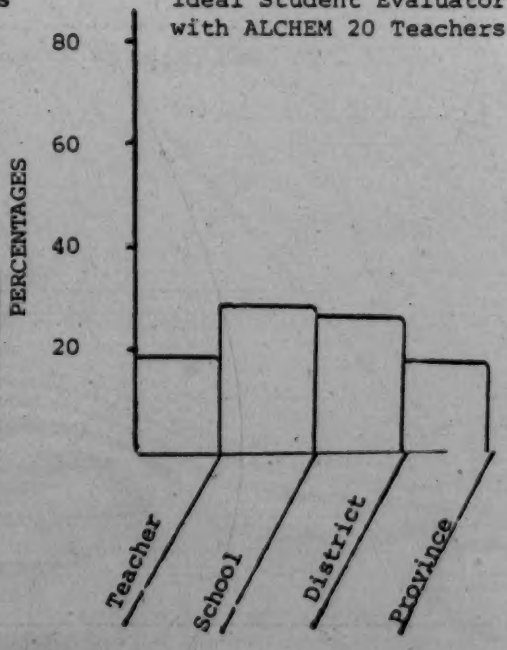


Figure 9.
Current Student Evaluators with Less Experienced Teachers

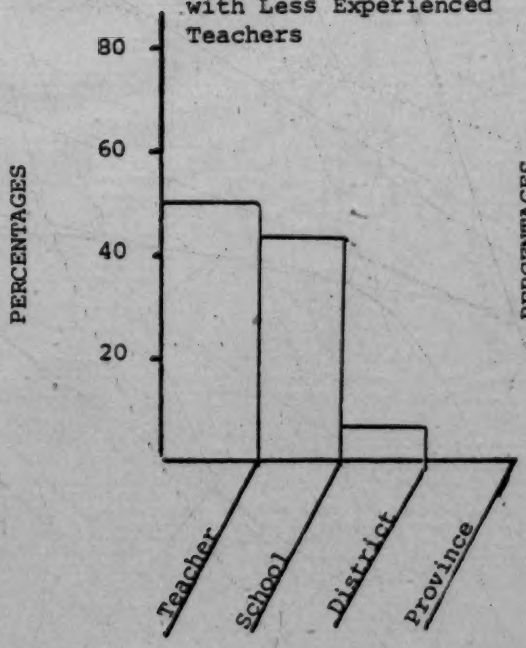


Figure 10.
Current Student Evaluators With more Experienced Teachers

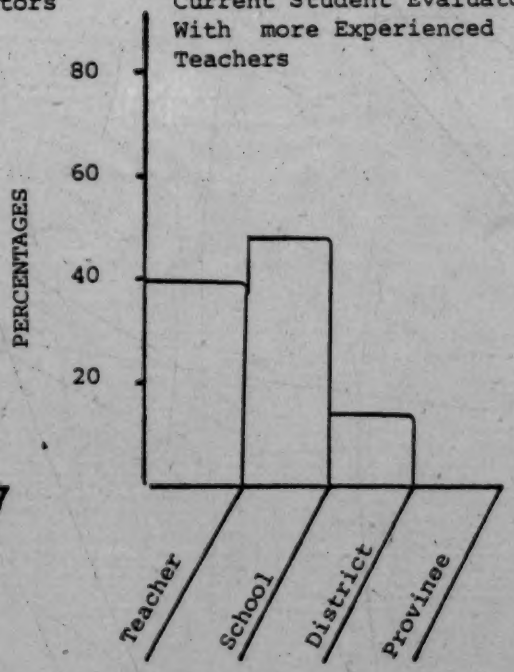


Figure 11.
Ideal Student Evaluators with less experienced Teachers

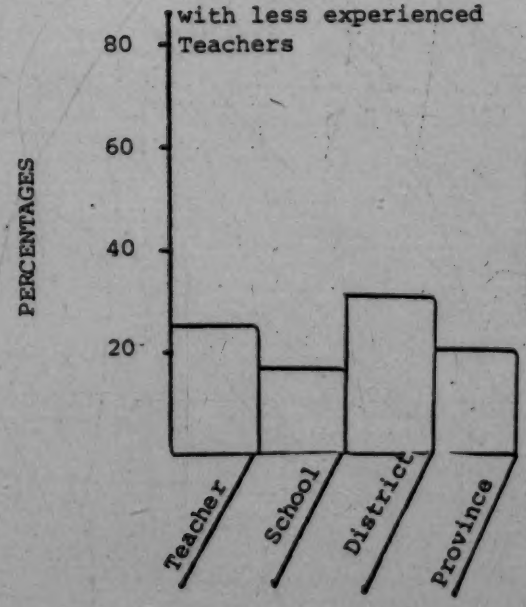


Figure 12.
Ideal Student Evaluators with more experienced Teachers.

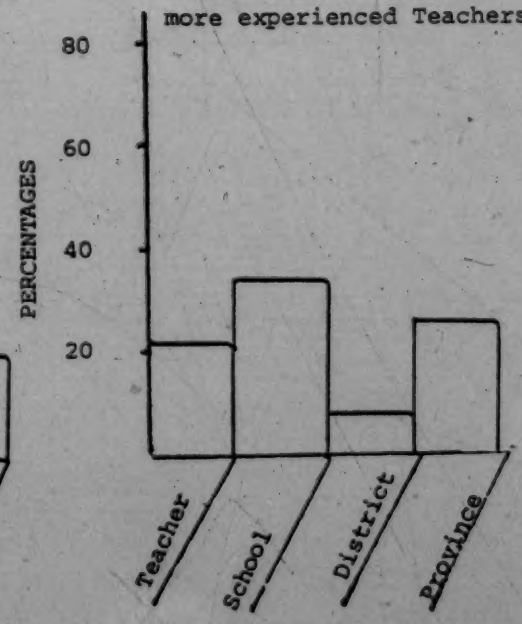


Figure 13.
Current Student Evaluators with Teachers with Less Education.

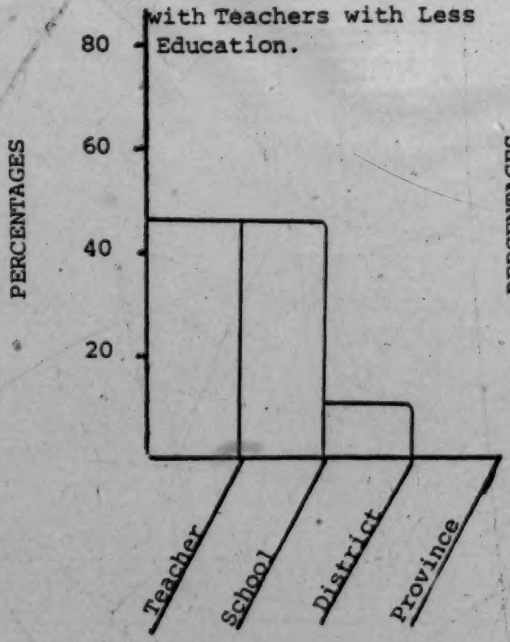


Figure 14.
Current Student Evaluators with Teachers with More Education.

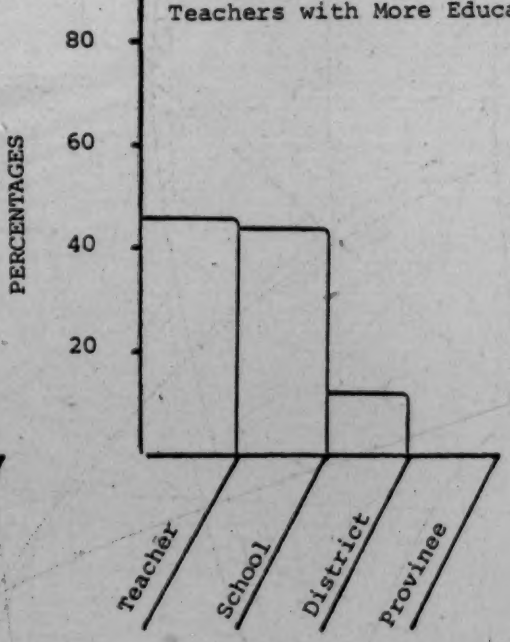


Figure 15.
Ideal Student Evaluators with Teachers with less Education

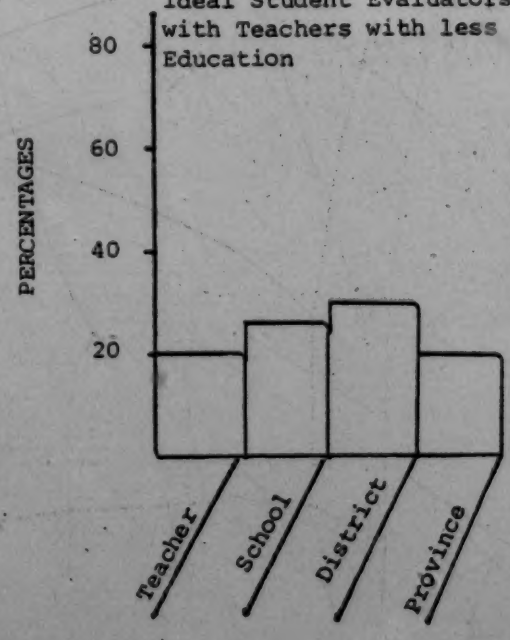
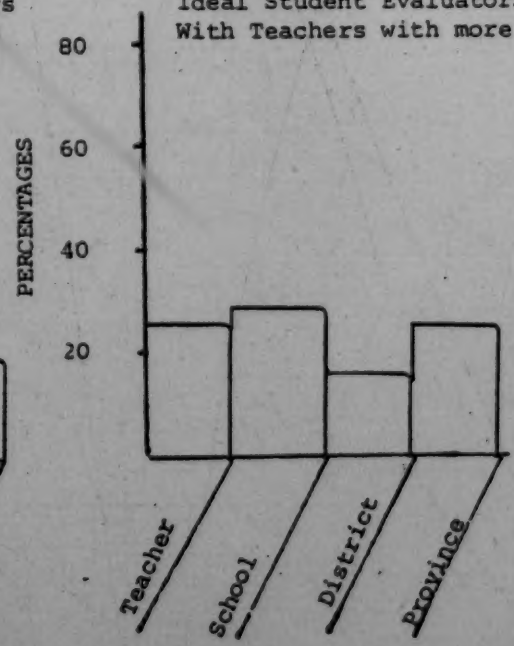


Figure 16.
Ideal Student Evaluators wtih With Teachers with more Education.



This was considerably lower than the 40.0% of the small staff Chemistry 20 teachers considering this level ideal. It would perhaps be more accurate to contrast the 11.1% with 52.0% - the percentage of "lone" Chemistry 20 teachers considering ideal the individual teacher combined with those considering the common school-wide examination ideal. If there is only one Chemistry 20 teacher in the school, it is still the individual teacher of each class that assumes responsibility for the final evaluation. Either way, the most decentralized form of evaluation is much more popular with the "lone" Chemistry 20 teachers than with teachers on a larger staff.

The current and desired level of responsibility for evaluation also varied with the program used as Figures 5 to 8 indicate. Currently, 62.5% of those using Keys to Chemistry as their core textbook also used an individual teacher final evaluation instrument, whereas this was the case with only 39.5% of the teachers using ALCHEM 20. However, the Keys to Chemistry teachers had a greater desire to centralize the final evaluation, than did the ALCHEM 20 teachers. Of the Keys to Chemistry teachers, 56.3% felt greater centralization would be ideal as compared to 46.5% of the ALCHEM 20 teachers. A greater percentage of the Keys to Chemistry teachers, 37.5%, would like to see a provincial final examination, compared to only 18.6% of the ALCHEM 20 teachers favoring this degree of centralization.

The current and desired level of responsibility for evaluation varied somewhat with years of chemistry teaching experience

(Figures 9 - 12), but not to the same extent as it did with size of Chemistry 20 staff or adopted program. Currently the teachers with ten or less years of experience are using a slightly more decentralized final evaluation than those with eleven or more years of experience. Those with less experience, however, are desirous of greater centralization (56.5% compared with 46.5%), so there is little variation in what they consider to be ideal.

The current or desired responsibility for final evaluation did not vary with the teachers' years of education (Figures 13 - 16).

It is clear that the sample reflects a trend away from teachers having and wanting to have the responsibility for the final evaluation in their Chemistry 20 programs. The choice of responsibility for final evaluation varies most with size of Chemistry 20 teaching staff, with the "lone" teachers currently having the most decentralized system and most preferring the individual teacher examination of all the categories examined. The current responsibility for evaluation also varies with the adopted program. The Keys to Chemistry teachers currently have a more decentralized system, but they have the greatest percentage of respondents (56.3%) desiring increased centralization and considering a common provincial exam to be ideal (37.5%).

Item 8

The teachers were asked for the extent of their agreement with four statements reflecting curriculum implementation decisions. The results are summarized in Table 15 (see Appendix D for response

TABLE 15

SOME SPECIFIC CURRICULUM IMPLEMENTATION DECISIONS

Rating Scale:
(1) strongly agree
(2) agree
(3) disagree
(4) strongly disagree

Statement	Mean Response
In my teaching I am consciously influenced by the objectives which are specified in the Alberta Education Curriculum Guide	2.0
Final student evaluation in my Chemistry 20 classes reflects achievement in the elective portion of the program as well as the core	2.0
I have opportunity for significant input into the selection of the prescribed core textual materials used in my Chemistry 20 classes	2.3
I find the Alberta Education Curriculum Guide is overly prescriptive and does not allow me enough freedom to adequately meet the needs of my students	3.1

distribution). A mean value was calculated for each item. Means below 2.25 indicated general group agreement. Means above 2.75 indicated a general group disagreement. Means between 2.25 and 2.75 were considered neutral, reflecting a group tendency to neither clearly agree nor disagree with the item. As individuals had no neutral option available to them, a mean in the interval considered neutral indicates that about half the group declared some degree of agreement with the item and the rest indicated some degree of disagreement.

The respondents agreed that they were consciously influenced by the curriculum guide objectives and that their final student evaluation measured learning in the elective portion of the program as well as core. As a group they did not find the curriculum guide overly prescriptive or restrictive.

The neutral group response on the third item indicates that it is not clearly a decision that teachers do or do not make, that is, about half the teachers clearly felt they had significant input into the textbook selection and the other half did not.

The data was further examined to see if the degree of agreement was related to any of the four independent variables. There were slight variations with category as shown in Table 16. Differences between subgroup means of 0.5 or more are noted. Attention is also drawn to smaller differences when these corroborate other findings of the questionnaire.

TABLE 16.

RELATIONSHIP OF SELECTED DECISIONS TO THE INDEPENDENT VARIABLES

STATEMENT	Size of Chemistry 20 Staff		Core Reference Adopted		TEACHERS YEARS OF EDUCATION		YEARS OF CHEMISTRY TEACHING EXPERIENCE	
	One	Two or More	Keys to Chemistry	ALCHEM 20	4 or less	5 or more	10 or less	11 or more
In my teaching I am consciously influenced by the objectives which are specified by the Alberta Education Curriculum Guide Sample mean 2.0	2.0	2.0	1.8	2.1	2.2	1.8	1.8	2.1
Final Student evaluation in my Chemistry 20 Classes reflects achievements in the elective portion of the program as well as the core. Sample mean 2.0	1.8	2.2	2.2	1.9	2.3	1.8	2.1	2.0
I have opportunity for significant input into the selection of the prescribed core textual materials used in my Chemistry 20 Classes. Sample mean 2.3	2.2	2.4	2.1	2.5	2.2	2.4	2.3	2.3
I find the Alberta Education Curriculum Guide is overly prescriptive and does not allow me enough freedom to adequately meet the needs of my students. Sample mean 3.1	3.2	3.0	3.3	3.0	3.1	3.0	3.1	3.0

The Chemistry 20 teachers with no colleagues felt more strongly that their final evaluation reflected achievement in the elective as well as core. This coincides with the findings that they were also the group most frequently using a classroom teacher exam. It would seem that the more decentralized the final evaluation, the more apt it would be to reflect elective material. The Keys to Chemistry teachers agreed that they had an opportunity for input into the selection of the prescribed core reference whereas the ALCHEM 20 group response was neutral. The teachers with more education agreed more strongly that they were influenced by curriculum guide objectives and that their final evaluation instrument measured elective as well as core material, than did teachers with 4 or less years of education. Years of chemistry teaching experience had little or no effect on the degree of agreement with these items.

Summary of Curriculum Implementation Item Findings

In items 4, 7, 8 and 9 data was gathered on curricular decisions teachers make as they translate into instruction curriculum that was established at another level. When making implementation decisions teachers, regardless of category, reported relying most on textual materials, personal experiences and interests, and colleague input. Although teachers reported being consciously influenced by curriculum objectives specified by Alberta Education, when planning for instruction the textbook and laboratory manuals were the most fundamental sources

of input into their decision making and were considered more important than provincial curriculum guides. Teachers relied more on their experiences and interests than on professional courses, workshops or associations. Teacher's experiences and interests were considered more important in planning than students' interests and experiences. Input from colleagues was more valued than input from curriculum consultants or members of the community.

Teachers reported a good deal of autonomy in their decision making as they translated the curriculum into instruction. They did not feel that the curriculum guide was overly prescriptive or that it restricted them. They reported making many implementation decisions on their own and if they did feel a need to consult or receive permission from someone it was nearly always with in-school personnel. Teachers perceived themselves as having considerable freedom and opportunity to make decisions while planning and implementing their Chemistry 20 program.

Because teachers relied heavily on the textbook when planning instruction the decision as to which core reference is adopted is an important one. The sample was divided on this item, with about half of the teachers reporting they did not have significant input into this decision. The fact that the teachers relied heavily on the textbook even though they had little or no say in its selection would indicate that they were not unhappy with the selection or the fact that the decision was made by someone else.

The teachers felt that their final evaluation measured achievement in the elective portion of the program as well as the core component. If one considers control of evaluation to reflect control of program, then teachers seem desirous of giving up some of the control they now have. The teachers tended away from having or considering ideal, an individual teacher examination and favored a more centralized form of evaluation. "Lone" Chemistry 20 teachers were considerably more in favor of a decentralized evaluation than were teachers on larger staffs. A common school-wide examination was the most popular form of evaluation in larger schools. Despite this step toward centralization already taken, more than half of these teachers desired still more centralization. About one quarter of the sample felt that to have a common provincial exam would be ideal.

Teachers are the main decision makers at the instructional level and the sample of this study reported making implementation decisions without feeling restricted by decisions made at societal or institutional levels. They indicated that they have perhaps more freedom and decision making responsibility than they desired, and would like to see more control, especially in the area of evaluation, given to other levels.

Curriculum adaptation decisions. A second area of decision making investigated was the teacher's role in adapting the perceived curriculum. The intent of adaptation is related, however, to the degree of prescriptiveness inherent in the curriculum the teacher

receives. For this reason, adaptation of core and elective portions of the program are considered separately. The core outline the teacher receives is much more prescriptive than is the elective outline. It should be noted, however, that the sample of teachers in the study did not perceive the curriculum they were implementing as overly prescriptive or restrictive (see Table 15). It would seem then, that teachers would consider adaptations to the program possible if they decided that changes were needed. Items 1, 2, 8, and 10 inquired into specific dimensions of decision making related to curriculum adaptation of the core.

Item 1

Information was gathered on the extent to which teachers emphasized one program goal over another. A weighting system was used in which the first choice was allocated three points, second choice two points and third choice one point. The totals for each goal were calculated and the goals arranged in Table 17 according to the extent they were valued by the sample. Also indicated is the number of teachers in the sample selecting each of the goals as their first, second and third choice.

The first and second goals were considerably more popular than the others. Together they were the first choice of 72.1% of the sample. This indicates an emphasis by the teachers on cognitive and discipline orientated programming. The third and fourth ranking goals, although they were not nearly as popular as a first choice (first choice of 18% of

TABLE 17

GOAL EMPHASIS

Goal	Frequency Selected First	Second	Third	Weight
Understand the principles, concepts and terminology of the discipline	28	9	2	104
Apply principles learned in the course to solve qualitative and/or quantitative problems	16	20	8	96
Develop proficiency in laboratory methods and techniques of the discipline	4	11	17	51
Relate knowledge acquired in class to real world or community systems and problems	7	7	12	47
Understand/appreciate interrelationships of science and technology with society	3	6	6	27
Develop appreciation/understanding of the scientific method	2	5	5	21
Acquire knowledge and attitudes toward chemistry which will assist in vocation selection	1	3	8	17
Acquire a knowledge and appreciation of the history and philosophy of chemistry	0	1	1	3
Be able to understand scientific research literature	0	0	0	0
Total	61	*62	59	

*One member of the sample marked two goals as equal for his second choice rather than discriminating between a second & third ranking goal.

the sample) were considerably more emphasized than the remaining goals. The ranking of these goals would indicate a desire by the teachers to achieve some discipline related skill objectives and to link the discipline in some way to the "real" world and to other disciplines. There was very little emphasis on affective or process goals. All the goals containing terms such as "attitude" or "appreciate" were in the least emphasized group.

The data was examined to see if the goal choices were related to any of the four independent variables. Table 18 summarizes the findings. The goals were arranged in order of their popularity as a first choice with the sample and the two goals not chosen first by any respondent were omitted from the table. Data in each cell indicates the frequency and percentage of each category choosing the goal as their first choice.

The two goals most popular as first choice did not vary with category, but slight deviations occurred in the third ranking goal. The goal to relate knowledge to the "real" world was as popular as the first ranking goal with the Keys to Chemistry teachers. They gave greater emphasis to this goal than any other category. ALCHEM 20 teachers emphasized it less than other categories and preferred instead goals related to laboratory skills and the interrelationship of science, technology and society.

Some deviations were noted in the extent of support for the first ranking goal. More than one half of the larger staff teachers, the

TABLE 18

RELATIONSHIP OF GOAL EMPHASIS TO VARIABLES

	Size of Chemistry 20 Staff		Adopted Core Reference		Teachers Years of Education		Years of Chemistry Teaching Experience	
	One	Two or More	Keys to Chemistry	ALCHEM 20	4 or Less	5 or More	10 or Less	11 or More
Understand the principles, concepts and terminology of the discipline	19 52.8%	9 36.0%	5 31.3%	22 51.2%	11 45.8%	17 45.9%	17 51.5%	11 39.3%
Apply principles learned in the course to solve qualilative and/or quantitative problems	10 27.8%	6 24.0%	4 25%	11 25.6%	8 33.3%	8 21.6%	7 21.2%	9 32.1%
Relate knowledge aquired in class to real world or community systems and problems	2 5.6%	5 20.0%	5 31.5%	2 4.7%	2 8.3%	5 13.5%	4 12.1%	3 10.7%
Develop proficiency in laboratory methods and techniques of the discipline	1 2.8%	3 12.0%	1 6.3%	3 7.0%	1 4.2%	3 8.1%	1 3.0%	3 10.7%
Understand/appreciate interrelationships of science and technology with society	2 5.6%	1 4.8%	0	3 7.0%	2 8.3%	1 2.7%	3 9.1%	0
Develop appreciation/understanding of the scientific method	1 2.8%	1 4.0%	1 6.3%	1 2.3%	0	2 5.4%	1 3.0%	1 3.6%
Aquire knowledge and attitudes toward chemistry which will assist in vocation selection	1 2.8%	0	0	1 2.3%	0	1 2.7%	0	1 3.6%

ALCHEM 20 teachers and the teachers with less experience gave top priority to understanding concepts and terminology of the discipline. Teachers in other categories tended not to cluster to the same extent around one goal, but were instead dispersed more evenly among the four top ranking goals. This trend for the ALCHEM 20 teachers to emphasize the one goal is interesting in light of the fact that the intent of the ALCHEM 20 program is clearly to relate chemistry to the students' experiences and environment and to stress the interrelationships of science, technology, and society. All categories could, however, be said to prefer cognitive goals over affective, skill, process or interdisciplinary goals.

Item 2

The Program of Studies for Senior High Schools (1978) identifies three areas of study: Solutions, Bonding and Organic Chemistry and under these topics specifies a total of seven concepts in the outline of the Chemistry 20 core. Information was gathered as to whether teachers emphasized some of the core concepts more than others. The results are summarized in Table 19.

A mean value, indicating emphasis, was calculated for each of the concepts and they were arranged from the most emphasized to the least emphasized. The mean of the first four concepts lies between "I give moderate attention" and "I give heavy emphasis." The mean of the latter three concepts lies between "I teach lightly" and "I give moderate attention," indicating considerably less emphasis.

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TABLE 19

CORE CONCEPT EMPHASIS

Rating Scale:
(1) I do not teach
(2) I only mention
(3) I teach lightly
(4) I give moderate attention
(5) I give heavy emphasis

Concept	Mean Response
Chemical substances exist as elements bonded together	4.5
Hydrocarbons from an important group of chemicals	4.5
Concentration represents the proportion of solute to solvent	4.4
Hydrocarbon derivatives form another important group of chemicals	4.3
Solutions are mixtures	3.8
Organic chemistry can be termed carbon chemistry	3.8
Formation of aqueous solutions is a chemical reaction	3.2

It would appear that the teachers in the sample are emphasizing one or more of the concepts in each of the three topics specified for the core program. The concepts were then clustered about the topic to which they related and a mean calculated for "topic" emphasis as indicated in Table 20.

"Bonding" ranked first as the most emphasized topic followed by "Organic Chemistry." The mean of the three concepts specified in this latter area was 4.2. Although one of the concepts identified for this topic was not emphasized (Table 19), the mean of 4.2 indicates an emphasis on the topic.

"Solutions" was the least emphasized of the three topics. The mean of the three concepts identified under this topic was 3.8, indicating that it is given "moderate attention" and rather less emphasized than the other two topics.

The data was further examined to see if the emphasis of certain topics was related to any of the independent variables. The results are summarized in Table 21. The relative emphasis of the topics did not vary with category. The four individual concepts that were most emphasized by the sample were also the four concepts most emphasized by each category.

Clearly none of the core topics or concepts in chemistry are being neglected by the teachers in the sample. Although the teachers did not see the curriculum guide as being "overly prescriptive" they do adhere to the core program outlined.

TABLE 20

TOPIC EMPHASIS

Rating Scale:
(1) I do not teach
(2) I only mention
(3) I teach lightly
(4) I give moderate attention
(5) I give heavy emphasis

Topic	Mean
Bonding	4.5
Organic Chemistry	4.2
Solutions	3.8

TABLE 21

RELATIONSHIP OF TOPIC EMPHASIS TO INDEPENDENT VARIABLES

TOPIC	SIZE OF CHEMISTRY 20 STAFF		ADOPTED CORE REFERENCE		TEACHERS YEARS OF EDUCATION		YEARS OF TEACHING EXPERIENCE	
	ONE	TWO OR MORE	KEYS TO CHEMISTRY	ALCHEM 20	4 OR LESS	5 OR MORE	10 OR LESS	11 OR MORE
Bonding	4.5	4.4	4.6	4.4	4.7	4.3	4.4	4.6
Organic Chemistry	4.2	4.1	4.2	4.1	4.2	4.0	4.0	4.4
Solutions	3.7	3.9	3.9	3.7	4.0	3.6	3.6	4.0

Item 10

Information was gathered on changes which teachers felt would contribute most to an improved Chemistry 20 program. Results are summarized in Table 22. A weighting system was used that allocated three points for first choice, two points for second choice, and one point for third choice. Items were then arranged in descending order of their perceived potential influence on the quality of the program. Also indicated is the number of teachers ranking each item as first, second or third, according to the influence they felt the item would have on improving the program.

The sample felt that the factors which would bring about the greatest program improvement were smaller classes, more and better instructual materials and instructor release time for program or material development. One of these three items was selected as first choice by 55.9% of the sample.

The three next most commonly selected items were better laboratory facilities, students better prepared to handle the course, and a changed course outline. The teachers selecting one of these items as their first choice comprised 27.1% of the sample.

"Other" was picked by four teachers or 6.8% of the sample as their first choice. The comments on this item reflected a teacher need for more time to cover the Chemistry 20 core material and a desire to get this time by a) reducing the elective time or b) increasing the total program time.

TABLE 22

SELECTION OF ITEMS TO IMPROVE THE PROGRAM

Changes Desired	Frequency of Choice First	Second	Third	Weighting
availability of more or better media or instructional materials	13	9	7	64
smaller classes	10	11	6	58
instructor release time to develop course and/or materials	10	8	2	48
better laboratory facilities	6	4	7	39
students better prepared to handle course requirements	5	2	9	28
changed course outline	5	4	2	25
professional development opportunities	0	8	8	24
increasing the time actually spent on elective topics	3	3	4	19
* other	4	0	2	14
more interaction with colleagues and/or administrators	1	2	6	13
more teacher-aide time	1	2	3	9
different goals and objectives	1	2	1	8
more freedom to choose materials	0	0	4	4
less interference from colleagues and/or administrators	0	2	0	2
more clerical assistance	0	2	0	2
Total	59	59	59	

*Items specified:

- "increase class time in Chemistry 20"
- "reduce time allocated to elective so core time could be expanded"
- "make Chemistry 20 a full year course"
- "65 hour course is being taught in 50 hours."

The data was further examined to see if the choice of factors which would most contribute to an improved program varied with category. Table 23 ranks the items according to the frequency with which the sample selected each factor first and provides a summary of the frequency of first selections in each category. The seven items that were not selected first by more than one person are not included individually but grouped together as the last factor in the list.

The changes that were desired did vary with the size of Chemistry 20 teaching staff. The larger staffs preferred to have release time to develop programs and materials, whereas the "lone" Chemistry 20 teachers preferred to have made available more and better materials. Better laboratory facilities were also desired by the small staff teachers.

The ranking of the factors also varied with program adopted. The ALCHEM 20 teachers most wanted to see smaller classes and this item was not included in first three ranking items of the teachers of Keys to Chemistry. Instead the concern of teachers of Keys to Chemistry was primarily for availability of better materials, instructor release time for material development, and a changed course outline. This latter item indicates some teacher dissatisfaction with the program outline as one of the selected factors included by this group under "remaining factors" was "different goals and objectives." This would indicate that 21.4% of the teachers of this program would like to see some changes in program goals and/or topics.

TABLE 23

RELATIONSHIP OF CHANGES NEEDED TO IMPROVE PROGRAM TO INDEPENDENT VARIBALES.

Changes Desired	Size of Chemistry 20 Staff		Adopted Prescribed Reference		Teachers Years of Education		Years of Teaching Experience	
	One	Two or More	Keys	ALCHEM	4 or Less	5 or More	10 or Less	11 or More
Availability of more or better media or instructional materials	9 (39.1%)	4 (11.1%)	4 (28.6%)	8 (18.6%)	6 (26.1%)	7 (19.4%)	8 (24.2%)	5 (19.2%)
Smaller Classes	3 (13.0%)	7 (19.4%)	1 (7.1%)	9 (20.9%)	4 (17.4%)	6 (16.7%)	6 (18.2%)	4 (15.4%)
Instructor release time to develop course and materials	2 (8.7%)	8 (22.2%)	2 (14.3%)	8 (18.6%)	2 (8.7%)	8 (22.2%)	5 (15.2%)	5 (19.2%)
Better laboratory facilities	3 (13.0%)	3 (8.3%)	1 (7.1%)	5 (11.6%)	4 (17.4%)	2 (5.6%)	4 (12.1%)	2 (7.7%)
Students better prepared to handle course requirement	1 (4.3%)	4 (11.1%)	1 (7.1%)	3 (7.0%)	1 (4.3%)	4 (11.1%)	3 (9.1%)	2 (7.7%)
Changed course outline	2 (8.7%)	3 (8.3%)	2 (14.3%)	3 (7.0%)	2 (8.7%)	3 (8.3%)	2 (6.1%)	3 (11.5%)
*Other	2 (8.7%)	2 (5.6%)	1 (7.1%)	3 (7.0%)	1 (4.3%)	3 (8.3%)	2 (6.1%)	2 (7.7%)
Increasing time actually spent on electives	0	3 (8.3%)	0	3 (7.0%)	1 (4.3%)	2 (5.6%)	1 (3.0%)	2 (7.7%)
Remaining factors	1 (4.3%)	2 (5.6%)	2 (14.3%)	1 (2.3%)	2 (8.7%)	1 (2.8%)	2 (6.1%)	1 (3.8%)

* See Table 22 for item s specified

The first ranking item also varied with teachers' years of education. Those with five or more years education would like to have release time to develop materials, whereas those with four or less years would like to have available to them more or better instructional materials. Teachers with four or less years of education also included a desire for better laboratory facilities in their three first ranking selections.

Selection of changes desired did not vary to any extent with years of chemistry teaching experience.

Item 8

Before adapting curriculum, teachers must decide what changes are needed by evaluating the existing program and/or materials. This item inquired into the teachers' satisfaction with the prescribed core reference adopted for use with their students. A mean value was calculated and shown in Table 24 (Appendix D contains frequency distribution). The result was a mean between 2.25 and 2.75 indicating a neutral group response. There was no neutral response available to individual teachers, therefore the neutral group mean response would indicate that the number of teachers reporting not being "well satisfied" with the materials was equal to the number of teachers expressing satisfaction.

The data was further analysed to see if the degree of satisfaction was related to any of the four independent variables and the findings are summarized in Table 25 (Appendix D contains frequency distribution).

TABLE 24

DEGREE OF TEACHER SATISFACTION
WITH PRESCRIBED CORE REFERENCE

Rating Scale:
(1) strongly agree
(2) agree
(3) disagree
(4) strongly disagree

Statement	Mean Response
I am well satisfied with the core textual materials prescribed for use in my Chemistry 20 classes	2.3

TABLE 25

RELATIONSHIP OF TEACHER SATISFACTION WITH PRESCRIBED CORE REFERENCE MATERIALS TO THE INDEPENDENT VARIABLES.

STATEMENT	SIZE OF CHEMISTRY 20 STAFF		CORE REFERENCE ADOPTED		TEACHER YEARS OF EDUCATION		YEARS OF CHEMISTRY TEACHING EXPERIENCE	
	ONE	TWO OR MORE	KEYS TO CHEMISTRY	ALCHEM 20	4 OR LESS	5 OR MORE	10 OR LESS	11 OR MORE
I am well satisfied with the core textual materials prescribed for use in my Chemistry 20 classes.	2.2	2.3	2.7	2.1	2.3	2.3	2.2	2.3
Sample mean 2.3								

The degree of satisfaction did vary with the core reference adopted, with the ALCHEM 20 teachers feeling more satisfied with their materials than the Keys to Chemistry teachers. This supports the findings of Item 7 in which the Keys to Chemistry teachers desired changes in program goals and/or topics. There was no variation in the other categories.

Summary of Responses to Curriculum Adaptation Decision Items

In items 1, 2, 8 and 10 data was gathered on curricular decisions teachers make as they adapt the curriculum they receive. This involves determining when a curriculum needs to be changed and deciding what changes should be made.

The sample of teachers was divided in its evaluation of the program adopted: half agreed to being "well satisfied" and half did not. The category which stood out as being least satisfied was the Keys to Chemistry group.

The sample adapted the program outlined in the curriculum guide by giving varying emphasis to the topics outlined for coverage in the core portion of the program. All topics were well covered, however, "Solutions" received the least attention of the three and "Bonding," the most.

Decisions made by teachers to emphasize one goal over another, are decisions which are also made in curriculum adaptation. Alberta Education cites six objectives (Appendix C) for Chemistry 20 in the

*Program of Studies for Senior High Schools (1978). The first mentioned is "Know the Chemical Principles underlying the chemistry specified in the core outline." It would appear that teachers value this goal more than others listed. The respondents of this study emphasized the cognitive and were discipline-orientated. According to Eisner's (1974) description of five conflicting conceptions of curriculum, the popularity of the two most popular goals in this study would be consistent with his "academic rationalism" orientation. The teachers are mainly interested in transmitting to the students the "products" of the discipline.

The most popular changes that teachers would like to see in order to improve the program were of two basic types. Firstly, the teachers desired more or better instructional materials, or release time to develop such materials. Secondly they desired changes which could be considered organizational or structural. These included smaller classes, better laboratory facilities and better prepared students.

Clearly the teachers are involved in adapting the curriculum they received. Young (1977) suggests that curriculum may need to be adapted because it is developed for students in general rather than specific people in specific situations. This does not appear to have

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*Hereafter in this study the Program of Studies for Senior High Schools (1978) will be referred to simply as the program of studies.

been an important motivator in this study. The changes made or desired were not to adapt the program to accommodate different kinds of learners, but rather to change the students and improve the resources to facilitate the attainment of the preferred cognitive, discipline-orientated goals.

Curriculum adaptation and creation decisions in the elective. A variety of curriculum work is required of the teacher in planning the elective portion of the Chemistry 20 program. The Program of Studies for Senior High Schools (1978) states (Appendix C) that in the organization of the Chemistry 20 program approximately twenty five hours of the total of sixty five hours of instructional time should be devoted to elective topics; that is about 40% of class time should be spent on the elective portion of the program. A minimum of one topic is to be studied and the topic may be chosen from a list provided or teacher selected and/or developed. Topics are to be an extension, an in-depth study, or a practical application of a core topic. In implementing the elective portion of the program teachers may make decisions regarding selection or adaptation of available curricular materials or they may use the opportunity to become involved in curriculum creation. Items 3, 5, 6 and 8 inquired into specific dimensions of decision making regarding elective curriculum adaptation and creation.

Item 5

Information was gathered on the extent to which teachers altered the prescribed time allocation for electives and the teachers' reasons

for adapting the time line. The amount of time teachers reported actually spending on electives is summarized in Table 26. A time interval was used to tabulate the data and the raw data was used to calculate the mean value for the respondents. On the average teachers in the sample were spending fourteen hours, or about 22%, of class time on electives. A low 20% of the sample indicated that they spent the prescribed twenty five or more hours on electives and at the other extreme, 23.3% of the sample indicated that they were spending little or no class time on electives.

The time spent on electives was further examined to see if it varied with the four independent variables. The results are summarized in Table 27. Each cell contains the frequency and percentage of teachers from each category reporting elective time within the interval.

The amount of time spent on electives varied only slightly with the prescribed core reference and the teachers' years of education (Figures 17 - 20). In these categories the Keys to Chemistry teachers and the teachers with five or more years education reported spending slightly more time on electives than those using ALCHEM 20 or those with four or less years of education. The Keys to Chemistry teachers tended to the extremes and had the greatest percentage of any category of teachers spending the prescribed amount of time on the elective. The ALCHEM 20 teachers on the other hand tended to cluster about the mean.

The amount of elective time varied more with years of teaching

TABLE 26

TIME SPENT ON ELECTIVES

Time Interval	Frequency	% of Respondents
0 - 4 hours	14	23.3
5 - 9 hours	4	6.7
10 - 14 hours	12	20.0
15 - 19 hours	8	13.3
20 - 24 hours	7	11.7
25 - 29 hours	11	18.3
30 - 34 hours	1	1.7
(1) <25 (did not specify)	3	5.0
Total	(2) 60	100.0%

Mean value of class time allocated to electives was 14 hours

(1) 3 teachers write in "<25" but did not specify how much time they were actually spending on electives

(2) no response from one individual

TABLE 27

RELATIONSHIP BETWEEN TIME SPENT ON ELECTIVE AND INDEPENDENT VARIABLES.

HOURS	SIZE OF CHEMISTRY 20 STAFF		ADOPTED CORE REFERENCE		TEACHERS YEARS OF EDUCATION		YEARS OF CHEMISTRY TEACHING EXPERIENCE	
	ONE	TWO OR MORE	KEYS TO CHEMISTRY	ALCHEM 20	4 OR LESS	5 OR MORE	10 OR LESS	11 OR MORE
0 - 4	2 8%	12 34.3%	4 25%	10 23.8%	6 25%	8 22.2%	9 28.1%	5 17.9%
5 - 9	0 0%	4 11.4%	2 12.5%	2 4.8%	1 4.2%	3 8.3%	1 3.1%	3 10.7%
10 - 14	6 24%	6 17.1%	1 6.3%	11 26.2%	5 20.8%	7 19.4%	8 25.0%	4 14.3%
15 - 19	7 28%	1 2.9%	1 6.3%	6 14.3%	4 16.7%	4 11.1%	6 18.8%	2 7.1%
20 - 24	5 20%	2 5.7%	3 18.8%	4 9.5%	3 12.5%	4 11.1%	2 6.3%	5 17.9%
< 25 (but did not specify)	0 0%	3 8.6%	0 0%	3 7.1%	2 8.3%	1 2.8%	2 6.3%	1 3.6%
25 - 29	5 20%	6 17.1%	5 31.3%	5 11.9%	3 12.5%	8 22.2%	4 12.5%	7 25%
30 - 34	0 0%	1 2.9%	0 0%	1 2.4%	0 0%	1 2.8%	0 0%	1 3.6%

FIGURE 17.

Hours Spent on Elective by Keys to Chemistry Teachers .
Mean= 15 hours.

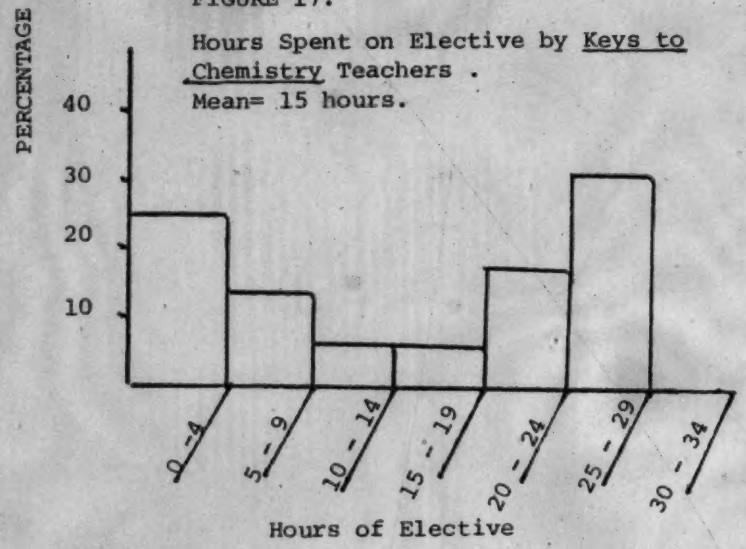


FIGURE 18

Hours Spent on Elective by ALCHEM 20 Teachers.
Mean = 13 hours.

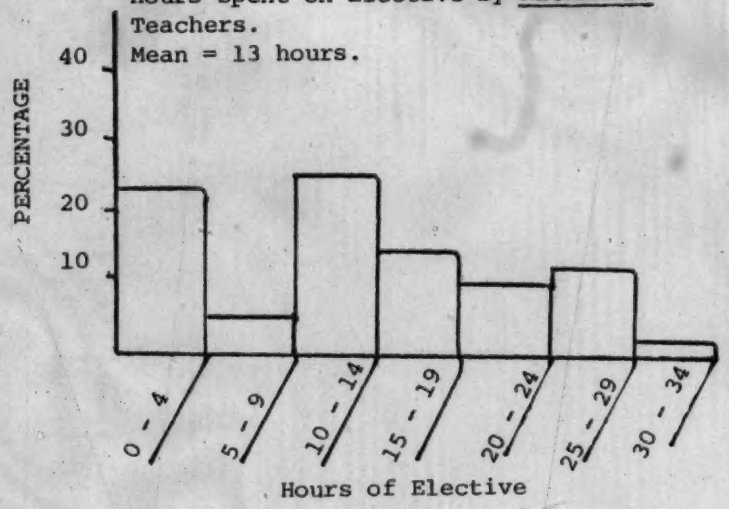


FIGURE 19.

Hours Spent on Elective by Teachers with Less Education.
Mean = 13 hours.

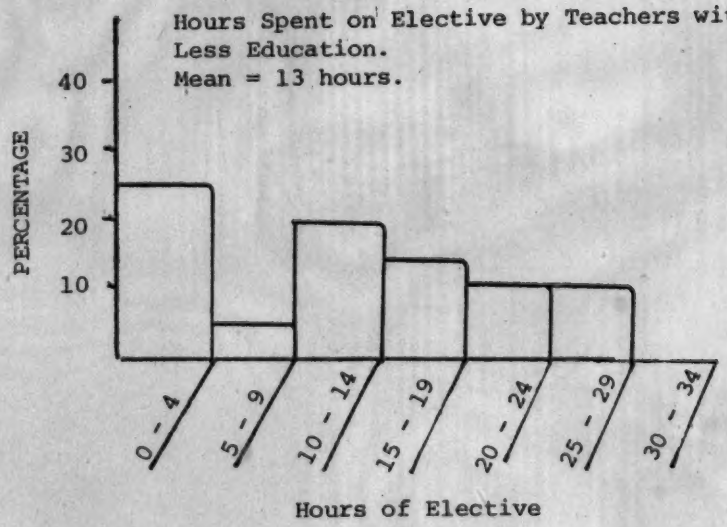


FIGURE 20.

Hours Spent on Elective by Teachers with more Education.
Mean = 14 hours.

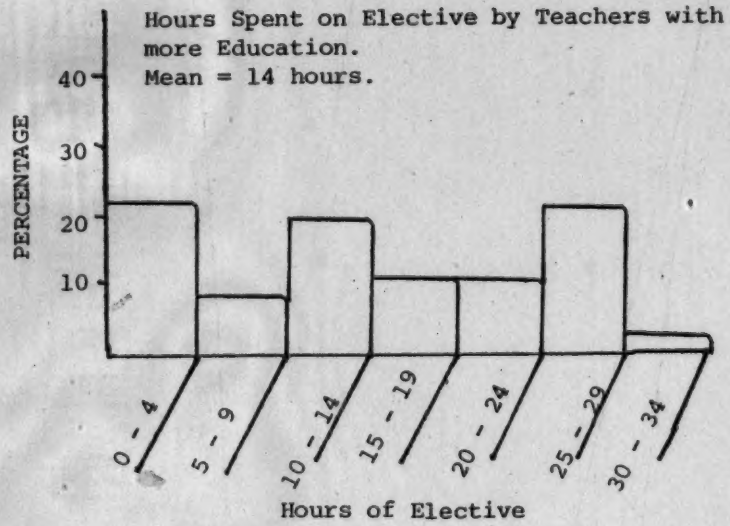


FIGURE 21.

Hours Spent on Elective by Less Experienced Chemistry Teachers.
Mean = 12 hours.

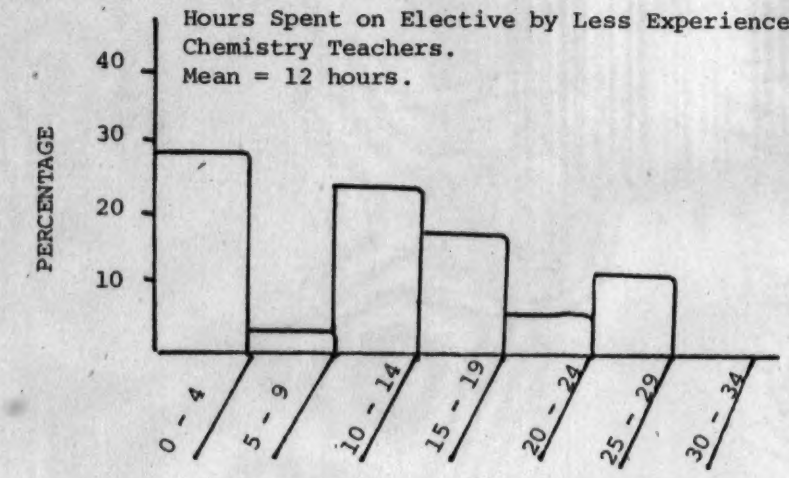


FIGURE 22.

Hours Spent on Elective by More Experienced Chemistry Teachers.
Mean = 16 hours.

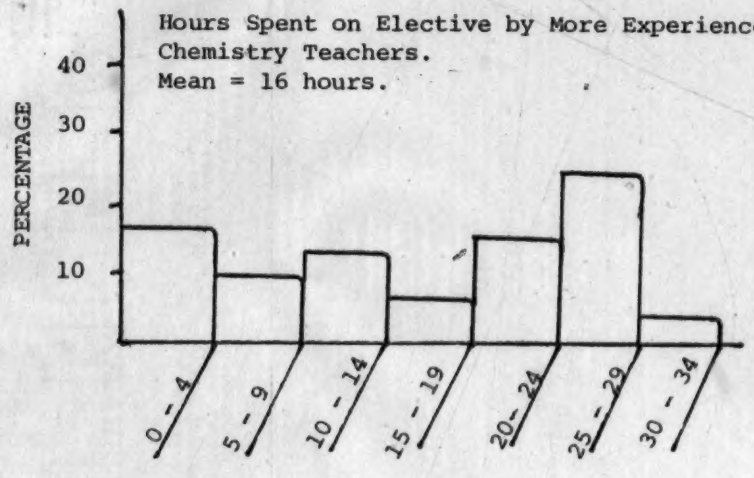


FIGURE 23

Hours Spent on Elective by "lone" Chemistry Teacher
Mean = 18 hours

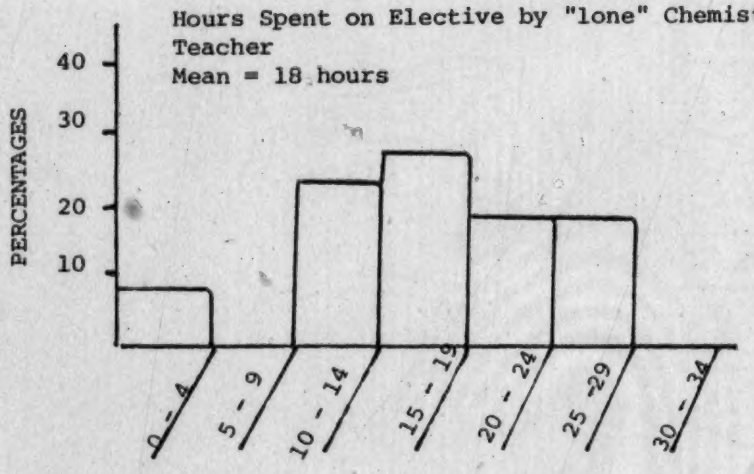
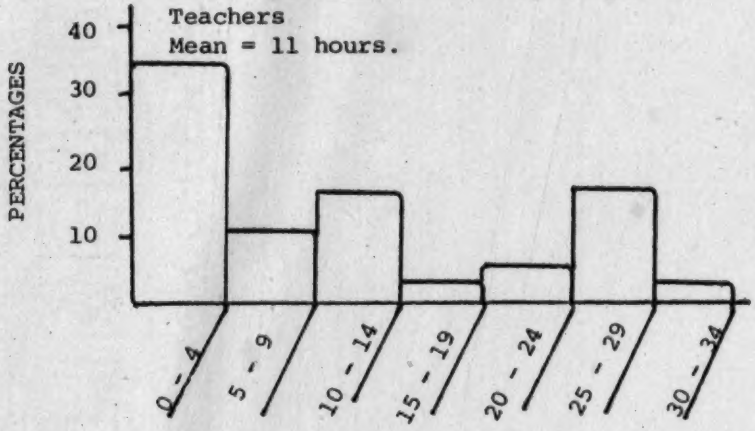


FIGURE 24

Hours Spent on Elective by Larger Staff Teachers
Mean = 11 hours.



experience (Figures 21, 22). Of the teachers with ten or less years of experience, 28.1% were spending essentially no time on electives as compared to 17.9% of those with more experience. Of those with more experience, 28.6% were spending twenty five or more hours on electives as compared to 12.5% of those with 10 or less years experience. The mean value of time allotted to electives for the more experienced teachers was four hours more than the mean for the less experienced teachers.

The amount of elective time varied most with the size of the Chemistry 20 teaching staff. The mean for the teachers in the larger school settings was eleven hours as compared to eighteen hours for the "lone" Chemistry 20 teachers. Figures 23 and 24 illustrate the distribution of the two groups of teachers over the time spent on electives. The large staff teachers tended to the extremes, with one group of teachers spending no time on electives and another group spending the suggested twenty five hours or more. The "lone" Chemistry 20 teachers, on the other hand, clustered about the mean forming a single broad peak (plateau). Of the larger staff teachers, 34.3% were spending no time on electives as compared to 8.0% of the small staff teachers.

An examination of the factors which the subjects reported influencing their decision to cut back on the suggested elective time are summarized in Table 28. Forty eight teachers, or 80% of the sample, reported spending less than twenty five hours on elective material. A

TABLE 28

FACTORS AFFECTING DECISION TO REDUCE ELECTIVE TIME

	Frequency selected first	Weighting (combined first, second and third choice)
Core topics cannot be managed in the time suggested	32	103
Core topics are more important than elective topics	8	59
Lack of time to develop elective curriculum	5	39
Lack of materials and/or resources for elective topic	0	21
Lack of interest (student or teacher) in elective topics	0	9
Lack of facilities	1	8
*Other	2	7
Total	48	

*Comments - "to adequately cover core extra work must be done"
- "students need more time to master material"
- "core needs expanded coverage"

weighting system was used in which the first choice was allocated three points, second choice two points, and third choice one point. The factors were then arranged according to their reported influence on the teachers. The frequency with which each factor was selected first was also recorded.

The responses clearly indicate that the teachers allow core material to flow over into time prescribed for elective use because they feel that the core requires more time than it is allocated; 64.6% of the respondents felt they were most influenced by this factor. Secondly, teachers felt that core topics were more important than elective topics and thirdly, teachers felt that they lacked the time required to develop elective curriculum.

The frequency with which each of these three predominant factors was selected first did not vary with any of the four independent variables (Table 29). Each cell indicates the frequency and percentage of each category choosing the factor as most influential (first choice). All respondents who spent less than the prescribed twenty five hours on electives, regardless of category, did so primarily because they felt the core could not be managed in the allocated time. They were also influenced by the fact that they considered core topics to be more important than elective topics.

The questionnaire results indicate that teachers are considerably altering the time allocations prescribed in the program of studies. More than three quarters of the study respondents are using all or a

TABLE 29

FACTORS INFLUENCING CATEGORIES OF TEACHERS REDUCTION OF ELECTIVE TIME

	Size of Chemistry 20 Staff		Adopted Core Reference		Teachers years of Education		Years of Chemistry Teaching Experience	
FACTOR	One	Two or More	Keys to Chemistry	ALCHEM 20	4 or less	5 or more	10 or less	11 or more
Core topics cannot be managed in the time suggested	16 (80.0%	16 (57.1%)	5 (45.5%)	26 (72.2%)	15 (71.4%)	17 (63.0%)	18 (64.3%)	14 (70.0%)
Core topics are more important than elective topics	3 (15.0%)	5 (17.9%)	4 (36.4%)	4 (11.1%)	3 (14.3%)	5 (18.5%)	4 (17.9%)	3 (15.0%)
Lack of time to develop elective curriculum	0	5 (17.9%)	1 (9.1%)	4 (11.1%)	1 (4.8%)	4 (14.8%)	3 (10.7%)	2 (10.0%)
Lack of material and/or resources for elective topic	0	0	0	0	0	0	0	0
Lack of interest (student or teacher) in elective topics	0	0	0	0	0	0	0	0
Lack of facilities	0	1 (3.6%)	0	1 (2.8%)	1 (4.8%)	0	1 (3.6%)	0
Other	1 (5.0%)	1 (3.6%)	1 (9.1%)	1 (2.8%)	1 (4.8%)	1 (3.7%)	1 (3.6%)	1 (5.0%)

portion of the elective time to cover core material. This is in spite of the caution in the curriculum guide:

> Care must be taken to ensure that a balanced treatment of the elective objectives is achieved. It is easy to usurp some of the time allotted to elective modules to cover the "more important" core material. The philosophy of the core elective approach dictates that this be scrupulously avoided. (Chemistry 10.20.30 Curriculum Guide, 1977, p. 14)

The most important reasons cited by the teachers in the sample for this adaptation, were that core could not be adequately covered in the time allocated, and that core content was considered to be more important than elective content.

Item 6

Information was gathered on what teachers do in the time they allocated to electives. Table 30 summarizes the elective selections of the forty six teachers in the sample that reported spending five or more hours on electives. Those teachers reporting 4 hours or less elective programming were considered to be not spending class time on electives. Some teachers selected one elective topic, some selected two or three. The actual number of teachers that reported teaching each elective as a part of or the total of their elective portion of the program is given, and used to arrange the electives from the most to least popular with the sample. The total number of hours devoted to the topic is also included to indicate the approximate time spent on the elective once it was selected.

TABLE 30

ELECTIVE TOPICS SELECTED

	Frequency	Sum of classroom hours
Topics or exercises considered optional but included in prescribed core texts	21	210
Qualitative Analysis	16	150
(1) Locally developed unit	14	165
Environmental Chemistry	11	85
(2) Other	9	95
Polymers: Long Chain Molecules	9	60
Biochemistry	4	20
Chemistry of the Car	1	5

(1) Topics specified:

- Ideal Gas Laws
- Bonding
- Tar Sands
- Quantum Mechanics
- Stoichiometry
- Quantitative Analysis

(2) Topics specified:

- Acid-Base Titration
- Stoichiometry
- Tar Sands
- Quantum Mechanics
- Bonding
- Solution Chemistry
- Extension of core topics

The "optional" material included in core textbooks was the most frequently selected topic. It accounted for an average of ten hours of elective programming in the twenty one classes (about 1/3 of the sample) selecting it. The second most frequently selected topic was "Qualitative Analysis." The popularity of this elective may indicate a desire to include more laboratory work in the program. This choice was followed closely by a "locally developed unit." Although "locally developed unit" was selected by slightly fewer teachers, slightly more time was actually spent on it. Topics specified under "locally developed unit" were Ideal Gas Laws, Bonding, Tar Sands, Quantum Mechanics, Stoichiometry and Quantitative Analysis. The list indicates that the teachers are generally designing units to promote understanding of discipline-orientated concepts and units which are generally of a theoretical nature. The topics specified suggest a poor fit with the curriculum guide intent of including elective time in the program:

> An elective portion of approximately forty to fifty percent of the time will be allowed for modules which take advantage of local interest, expertise and facilities...elective modules would contain those parts of current interest...aspects of the program which are most susceptible to change can be placed in the elective...modules which involve more than one discipline could be developed...adaptable to individualization.
> (Chemistry 10.20.30 Curriculum Guide, 1977, pp. 13, 14)

The topics selected for locally developed units by the teachers in the sample reflect discipline needs, rather than individual needs or local

or current interests.

"Environmental Chemistry" was the fourth most popular selection and represents the first evidence of an interdisciplinary topic. Also moderately popular was "other" topics. Topics specified in this category were very similar to those specified in "locally developed unit." The list included Acid-Base Titration, Stoichiometry, Tar Sands, Quantum Mechanics, Bonding, Solution Chemistry, and an extension of core topics. The least popular elective topics were Polymers, Biochemistry and Chemistry of the Car.

An examination of the relative popularity of various elective topics is indicative of what teachers perceive to be the role of the elective. Emphasis on the core is clearly evident. Materials in the prescribed core reference are used most frequently rather than seeking elective material elsewhere. Topics specified under "locally developed units" and "other" were very "core-like." All but perhaps "Tar Sands," are theoretical topics which are included in textual materials. If "Tar Sands" was categorized under Polymers and the remainder of the topics considered to fit in the first category "optional core material" the overall program emphasis on core would be more evident,as Table 31 indicates.

The choice of elective topics was examined to see if it related to the four independent variables. The results are summarized in Table 32. Data is provided for only the four most frequently selected electives in each category. Each cell contains the frequency and per-

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TABLE 31

ELECTIVE SELECTIONS RECATEGORIZED

	Frequency	Sum of classroom hours
Core Topics (optional or related)	41	435
Qualitative Analysis	16	150
Polymers: Long Chain Molecules	12	85
Environmental Chemistry	11	85
Biochemistry	4	20
Chemistry of the Car	1	5

TABLE 32

RELATIONSHIP OF ELECTIVES SELECTED TO INDEPENDENT VARIBALES

TOPICS	Size of Chemistry 20 Staff		Adopted Core Reference		Teachers Years of Education		Years of Chemistry Teaching Experience	
	One	Two or More	Keys to Chemistry	ALCHEM 20	4 or less	5 or more	10 or less	11 or more
Optional topics included in core reference (21)	6 26.0%	15 62.5%		19 57.6%	10 55.5%	11 37.9%	10 41.7%	11 47.8%
Qualitative Analysis (16)	9 39.1%	7 29.2%	4 33.3%	12 36.4%	8 44.4%	8 27.6%	5 20.8%	11 47.8%
A Locally Developed Unit (14)	8 34.8%	6 25.0%	6 50.0%	8 24.2%	4 22.2%	10 34.5%	6 25.0%	8 34.8%
Environmental Chemistry (11)	9 39.1%		4 33.3%			10 34.5%		9 39.1%
Other (9)		4 16.6%		4 12.1%	4 22.2%		6 25.0%	
Polymers: Long chain Molecules (9)			5 41.6%					
Biochemistry (4)								
Chemistry of the Car (1)								

centage of each category which selected each elective. Percentages do not total 100% because individuals may have selected more than one elective. The topics are arranged in the order of their popularity with the sample as a whole. With one exception the first four choices in each category fell within the first five choices of the sample. The popularity of the electives varied only slightly with teachers' years of education, years of teaching experience, or size of Chemistry 20 staff. In these three groups the "lone" Chemistry 20 teachers were, however, the only category in which "optional topics in prescribed core reference" was not the most popular elective.

The choice of electives did vary with the adopted core reference. The selection of those using Keys to Chemistry differed from those using ALCHEM 20 and from the sample as a whole. "Locally developed units" and "Polymers" were more popular in this category than in any other and "Optional Material in Core" was far less (ranked seventh) popular.

The optional material is explicitly labeled in the ALCHEM 20 program. It would appear that when it is presented as such, teachers tend to use it as elective material. Optional topics are not as explicit in Keys to Chemistry. Teachers using this program tend to develop their own elective units or look elsewhere for other elective curricular material. This would seem to be additional evidence of the text becoming the "curriculum." Only when the text does not contain an option do teachers seek out other resources. This reliance on the text

is inconsistent with the statements in the curriculum guide:

> All too often a textbook has been accepted in many classrooms as the program of studies. Experience has shown that the use of a single text has been inadequate when teachers attempt to meet the range of individual abilities. One must consider both the strengths and limitations of a textbook and exercise discretion in its use.... No text manual or single aid will provide a creative and appealing approach to instruction for everyone. (Chemistry 10.20.30 Curriculum Guide, 1977, p. 8)

It is, however, evident that when teachers looked beyond their prescribed text for elective material they also selected core-like topics. The source of their topics was different but the program remained dominated by the core.

Table 33 is an ordered listing of the way elective material was primarily viewed by the 46 teachers that spent 5 or more hours of class time doing elective topics. Most of the respondents saw the elective as an extension of a core topic. The ranking of the importance of these factors did not vary with any of the four independent variables.

The three factors which had the greatest influence on which elective topics were selected by the 46 teachers spending class time on electives are ordered in Table 34 from most to least influential. A weighting system was used which allocated three points for each first choice, two points for each second choice and one point for each third choice. The frequency with which each item was selected first, second and third is also reported. The "teachers' experience, know-

TABLE 33

PERCEIVED RELATIONSHIP OF ELECTIVE TO CORE

Relationship	Frequency	% of Respondents
An extension of a core topic	27	58.7
Core theory put into an applied context	14	30.4
An in-depth intensive study of a core topic	4	8.7
Topics unrelated to core	1	2.2
Total	46	100.0%

TABLE 34

FACTORS AFFECTING CHOICE OF ELECTIVE

	Frequency of choice first	second	third	Weighting
My personal experience, knowledge, interest, etc.	19	16	6	105
Student characteristics and/or preference	9	14	9	64
School facilities	5	10	14	49
Other (1)	11	2	1	38
The decision was made at another level	2	1	1	9
Local (community) interests	0	2	4	8
(2) Total	46	45	35	

(1) Factors specified when "other" was first choice

- Need to emphasize core material (six comments)
- Meeting individual student needs (three comments)
- Staff consultation and agreement (two comments)

(2) Not all of the 46 teachers spending time on electives made three choices ∴ totals vary.

ledge and interests" was by far the most influential factor. "Student characteristics" was second most influential, followed by "school facilities." The "other" category was selected first by a larger number of teachers than the weighting system would indicate. If the factors were ordered according to frequency with which they were considered the most influential (first choice), "other" would have been second in importance. Factors specified under "other" as influencing elective selection included: the need to emphasize core material (six comments), meeting individual student needs (three comments), and consensus of staff (two comments). The factors specified considerably overlap the factors that were available for selection. The researcher recategorized them and Table 35 shows the resultant frequency of first choice of factors affecting selection of elective topics.

In general teachers see the elective content as an extension of a core topic and the selection of the elective content is most influenced by the teachers' experience, knowledge and interest. Student experience and interest are considered secondarily. The curriculum guide stipulates a reverse priority:

> The purpose of the module structure is to provide flexibility in the approach to local needs. This should remain upper-most in deciding what is to be covered in the elective portion of the course.... In considering the objectives of the modules a number of factors should be considered
> 1. Balance of theory vs practical application and a balance in the teaching activities to match the learning style of the students
> 2. Interests of the students
> 3. Interests of the teacher

TABLE 35

FACTORS AFFECTING CHOICE OF ELECTIVE RECATEGORIZED

Factor	Frequency of First Choice
Teacher experience, knowledge, interest, etc.	19
Student needs, characteristics and/or preference	12
Need to emphasize core (discipline needs)	6
School facilities	5
Decision made at another level	4
Local community interests	0
Total	46

4. Expertise of the teacher
5. Facilities and resource materials available.
(Chemistry 10.20.30 Curriculum Guide, 1977, p. 8)

Item 8

The sample was asked for a) the degree of their individual involvement in developing an elective unit and b) the extent of their agreement with five statements reflecting curriculum decisions related to the elective portion of the program.

The elective portion of the program provides teachers with an opportunity to create curriculum. Information was gathered to determine what portion of the sample and of the subgroups had experienced this type of decision making, and the results summarized in Table 36. Each cell contains the frequency and percentage of each category making the selection. Of the respondents, 30% had been or currently were involved in the local development of a curricular unit. Involvement in local creation of curriculum did not vary with size of Chemistry 20 staff or with teachers' years of education. There was, however, variation with adopted core reference and years of teaching experience. The Keys to Chemistry teachers indicated 43.8% had been involved in curriculum creation at the local level whereas only 21.4% of the ALCHEM 20 teachers had been involved. The difference between the more experienced and less experienced teachers was even greater, with 46.4% of those with 11 or more years experience having been involved as compared to 15.7% of those with 10 or less years experience.

TABLE 36

RELATIONSHIP OF CURRICULUM CREATION
TO THE INDEPENDENT VARIABLES

		I have been or currently am involved in the creation of a locally developed unit.	
		Yes	No
	Sample Respondents	18 (30.0%)	42 (70.0%)
Size of Chemistry 20 Staff	one	7 (28.0%)	18 (72.0%)
	two or more	11 (31.4%)	24 (68.6%)
Adopted Core Reference	Keys to Chemistry	7 (43.8%)	9 (56.3%)
	ALCHEM 20	9 (21.4%)	33 (78.6%)
Teachers Years of Education	4 or less	6 (26.1%)	17 (73.9%)
	5 or more	12 (32.4%)	25 (67.6%)
Years of Chemistry Teaching Experience	10 or less	5 (15.7%)	27 (84.3%)
	11 or more	13 (46.4%)	15 (53.6%)

The second purpose of this item was to gather data on the extent respondents agreed with five statements related to elective curriculum decision making. A mean value was calculated for each item. Means below 2.25 indicate general group agreement. Means above 2.75 indicate a general group disagreement. Means between 2.25 and 2.75 were considered neutral as the group tendency was not clearly to agree or disagree with the item. The results are summarized in Table 37. (Appendix D contains the frequency distribution.)

The respondents agreed that they frequently used elective time to continue teaching core material. They also indicated that they felt they had the knowledge and experience needed to develop curriculum.

The neutral response to the next two items indicates that half the teachers are satisfied with what they are doing in the elective portion of the program and half are not. The respondents were also split on whether or not curriculum creation was a decision making area in which teachers should be involved. Half the respondents felt teachers should concentrate on adapting selected materials rather than developing them locally.

The respondents indicated that they mildly disagreed with making a clear distinction to their students between the elective and the core portion of the Chemistry 20 program. This is predictable in light of the findings that the elective material used was very "core-like."

The data was further analyzed to see if the degree of agreement was related to any of the four independent variables. Results are

TABLE 37

SOME SPECIFIC CURRICULUM DECISIONS
RELATED TO THE ELECTIVE

Rating Scale:

(1) strongly agree
(2) agree
(3) disagree
(4) strongly disagree

Statement	Mean Response
I find that I frequently have to use time intended for the elective portion of the Chemistry 20 program to continue teaching core material	1.9
I feel I have the knowledge and expertise needed to develop a curricular unit for my classes	2.0
What I am actually doing in the elective portion of the Chemistry 20 program is far from what I consider to be ideal	2.3
I feel that teachers should concentrate on adapting available materials for their classes rather than trying to create their own curricular unit	2.3
I make a clear distinction between elective and core material to my students	2.8

summarized in Table 38 (Appendix D contains the frequency distribution). Differences between subgroup means of 0.5 or more or slightly smaller differences which corroborate findings of other questionnaire items are noted.

The greatest variation with category occurred in the teachers expertise in curriculum development. The larger staff teachers felt more knowledgeable than the smaller staff teachers, Keys to Chemistry teachers more knowledgeable than ALCHEM 20 teachers, those with more education more knowledgeable than those with four or less years and those with more experience more knowledgeable than those with 10 years or less. The subgroups that felt they had the expertise to develop curriculum were also the subgroups that had a greater percentage of their members currently or previously involved in curriculum creation (Table 36), although in some instances these differences had been small. Many teachers who felt they had the expertise to develop curriculum were, however, not actually involved in doing so.

Agreement with the other four items did not vary with teachers' years of education or chemistry teaching experience. There was, however, some variation with size of Chemistry 20 staff and adopted core reference. The ALCHEM 20 teachers agreed more strongly that they used elective time for core material and this supported the findings (Figure 17 and 18) that only 14.3% of the ALCHEM 20 teachers were spending the prescribed amount of time on the elective as compared to 31.3% of the Keys to Chemistry teachers. The larger staff

TABLE 38

RELATIONSHIP OF ELECTIVE DECISIONS TO THE INDEPENDENT VARIABLES

	Size of Chemistry 20 Staff		Adopted Core Reference		Teachers Years Of Education		Years of Chemistry Teaching Experience	
	One	Two or More	Keys to Chemistry	ALCHEM 20	4 or Less	5 or More	10 or Less	11 or More
I find that I frequently have to use time intended for the elective protion of the Chemistry 20 program to continue teaching core material (sample mean 1.9)	1.9	1.8	2.2	1.7	2.1	1.8	1.9	1.9
I feel that I have the knowledge and expertise needed to develop a curricular unit for my classes (Sample mean 2.0)	2.3	1.8	1.7	2.1	2.3	1.8	2.2	1.7
What I am actually doing in the elective portion of the Chemistry 20 program is far from what I consider to be ideal (sample mean 2.3)	2.6	2.2	2.5	2.3	2.4	2.2	2.2	2.4
I feel that teachers should concentrate on adopting available materials for their classes rather than trying to create their own curricular unit (sample mean 2.3)	2.2	2.4	2.4	2.3	2.3	2.3	2.2	2.3
I make a clear distinction between elective and core material to my students (sample mean 2.8)	2.6	2.9	3.0	2.6	2.7	2.8	2.6	2.9

teachers agreed more than the "lone" chemistry teachers that what they were doing in the elective was not ideal. They were also the group with the lowest mean number of elective classroom hours (Figure 24) and with the greatest percentage of teachers spending no time on electives (Table 27).

Item 3

The advantages of including elective topics in a Chemistry 20 program as reported by the sample in response to an open-ended question formed eight clusters. The information received is summarized by providing a generalized statement about which the comments appeared to cluster. Secondly, the number of comments in the cluster is recorded and thirdly, some sample comments are given.

1. Elective time allows for greater emphasis or extension of material presented in the core portion of the program (30 comments).

   - core is too brief in certain areas
   - flexibility for extension of core
   - supplement a deficient core outline
   - allow for in-depth study of certain areas
   - supplement to core
   - follow up to core
   - better prepare students for next course.

2. Elective time provides students with an opportunity to explore areas of group or individual interest (23 comments).

   - provide choice of topics for students
   - explore areas of student interest
   - cater to varied interest of class
   - provide opportunity for individual student interest
   - room for individual choice is motivating factor

- follow class interest in an area
- opportunity to provide a different approach to learning.

3. Elective time provides an opportunity to increase the relevancy of the program, to show the interaction of the Chemistry 20 course and "real life" (21 comments).

- explore topics of current interest
- relate chemistry to students' environment
- show chemistry as a part of our life
- increase appreciation of the utility of chemistry
- study topics from locale
- have student appreciate broader scope of chemistry.

4. Teacher has the opportunity to develop curriculum and increase the scope of the course during the elective portion of the program (18 comments).

- chance to explore topics not included in core
- study topics of teacher or student interest
- teacher can choose subject matter
- free to develop objectives and curriculum
- opportunity to introduce new topic
- provide background information not included in core
- develop student skill in time and equipment management.

5. Elective topics can reflect teachers' interest and expertise (9 comments).

- teacher specialization can be included
- teacher can include their area of interest and competency
- study topics of interest to teacher
- capitalize on special teacher skill or knowledge.

6. Applications of core concepts/theory can be explored in elective portion of the program (7 comments).

- students can apply concepts
- give students knowledge and application of chemistry applications
- apply theory.

7. Elective time is not an advantage of the program (5 comments).

   - elective is required by Alberta Education
   - to fill in time
   - what gives you the idea there are advantages.

8. Elective time provides an opportunity for more laboratory work (4 comments).

   - opportunity for more experimental work
   - time to develop laboratory skills.

The comments provided by the teachers in the largest cluster indicate again that allowing for flexibility in allocating core time is one of the main advantages of scheduling elective time in a program. If additional time is needed to cover core topics, it is available.

The second most frequently commented on areas (clusters 2, 3 and 6) indicate a teacher awareness that elective time provides an opportunity to focus on student interests and to balance the theory and practical in the course. The opportunity to consider topics of student or current interest is an advantage more often cited than was the opportunity to serve teacher desire to be involved in curriculum creation or teacher interest (clusters 4 and 5). This is the reverse order of these two areas reported in Table 34, where teachers perceived themselves relying mainly on their personal interests and expertise when selecting elective topics.

Clusters 7 and 8 represent comments from a small portion of the respondents expressing negative feelings about the elective and an

interest in increasing the laboratory emphasis of the program.

Summary of Curriculum Decision Making in the Elective

In items 3, 5, 6 and 8 data are given on curricular decisions related to the elective. These decisions included curriculum adaptation and curriculum creation. A great deal more of the former was reported than the latter.

Teachers adapted considerably the program organization outlined in the program of studies. The decisions made go beyond what could be called adaptation according to the definition used in this study; "changes made in the perceived curriculum while attempting to maintain the intent of the curriculum developers." Decisions made by teachers to spend no time on electives or to greatly usurp the elective time for core topics, adapted the program outline to the extent that the program intent was no longer being carried out. The program as outlined was not being implemented by a considerable number of teachers. Curricular decisions made by teachers created a gap between the "intended" and the "actual" program similar to that outlined by Fullan (1977).

Teachers expressed the advantages of elective topics in a way which closely paralleled the program intent. When actually selecting or creating the elective material for their students the advantages stated appeared more theoretical than real.

Topics selected were influenced more by teacher experiences and interests than by student or local interests. When curriculum was

developed locally it continued to reflect "discipline needs" rather than accommodating community or individual differences. These decisions by the teachers again altered the program intent outlined in the program of studies. The curriculum received by the teachers considered the elective to be an integral part of the program and the advantages of such an approach are clearly stated (Appendix C). The teachers viewed the core as fundamental, or of primary importance, to the Chemistry 20 program and the elective as of secondary importance. They perceived the elective time as "belonging" to the core topics if it was needed whereas the curriculum guide cautions against this. The majority of the teachers repeatedly expressed the feeling that they could not adequately cover the core content in the time allocated. They felt that because of the importance of this portion of the program they were justified in using elective time to help the students achieve the core concepts outlined.

The teachers generally felt competent to create curriculum but were ambivalent as to whether or not they felt it was part of their role. This ambivalence is reflected in the percentage of teachers (less than one third of the respondents) participating in curriculum development. Teachers were far less active in curriculum creation decision making than they were in curriculum implementation or adaptation.

Interview Schedule Results

The list of items used to focus the interview is included in Appendix A. The items were used as a stimulus for a secondary

source of data on teacher decision making in curriculum implementation, adaptation and creation. The three teachers interviewed are briefly profiled prior to providing a summary of the interview results.

Teacher A was responsible for all the Chemistry 20 classes in a Junior-Senior High School located in a community with a population of less than 1000. Keys to Chemistry was the adopted core reference. Teacher A had five years University education and between six and ten years teaching experience, but was teaching Chemistry 20 for the first year.

Teachers B and C had colleagues also teaching Chemistry 20, had adopted the ALCHEM 20 core reference, had six years University education and between six and ten years experience teaching Chemistry 20. Teacher B was located in a small urban high school and teacher C in a large urban high school.

Teacher A begins his curriculum planning using the curriculum guide as his main resource, whereas teachers B and C relied more heavily on the textbook. None of the teachers felt themselves restricted by an overly prescriptive curriculum guide. Teacher B had a say in the selection of the prescribed core reference whereas teachers A and C did not.

Core concepts were emphasized by all three of the teachers. If they felt the textbook was deficient in any area they augmented it with additional material, making sure that all of the core topics were well covered. Teachers felt that the core contained what the students

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"must have" and the elective material was of a secondary nature. All three of the teachers allowed core material to spill over into elective time. Teacher A felt that lack of experience in teaching Chemistry 20 was a prime factor affecting this adaptation. The desire was present to spend more class time on electives (currently ten to fourteen hours was spent on electives) and Teacher A anticipated that with more experience in the program, teaching "shortcuts" would become obvious and the core could be managed in less time. The perceived advantage of the elective portion of the program in Teacher A's case was to stimulate student interest, link chemistry to the real world and help students get into the current literature. The selection of elective topics reflected these desires but the current situation was considered not to be ideal and the hope for the future was to introduce more student choice (via projects or Science Fairs) into the elective portion of the program.

Teacher C was currently spending about 15 hours on elective topics. Decisions in this large urban school were reached by concensus of those involved. The Chemistry 20 teachers agreed on the time allocation and the selection of an analytical chemistry unit available to them through the ALCHEM 20 program. The elective choice was influenced by the desire to increase the laboratory work in the program and precedent set within the school. There was the feeling that individuals teaching Chemistry 20 were part of a "team" and made curricular decision as a group.

Teacher B felt the core-elective approach was not operational in many classrooms. Core was emphasized and the optional material included in the textbook was considered, in most cases, necessary rather than supplementary to the core. If after this coverage, any class time remained, it was used for remedial work or enrichment depending on the individual student. Readiness for the next course was considered the prime student need.

None of the three teachers developed the elective material they were currently using in their Chemistry 20 classes. All felt they had the expertise, but not the time, to create curriculum.

Size of class and nature of the Chemistry 20 program kept Teacher A out of the laboratory more than was felt to be desirable. In spite of this, however, Teacher A felt quite autonomous in decision making and favored the individual teacher examination for final evaluation. Teacher B constructed (in consultation with colleague) the final evaluation instrument which focused on core material. Teacher B did not feel that the program organization lent itself to the use of a common provincial examination but also felt that the introduction of such an instrument would not interfere or be restrictive. Any restrictions he felt in program planning were "in school" conflicts or considerations. Teacher C used a common school-wide examination and felt that teachers as professionals should be responsible for evaluation. Teacher C would, however, have liked to see a Canada-wide benchmark examination, perhaps even measuring cumulative learning from

Chemistry 10, 20 and 30. Use of such an examination would be optional, with an objective of establishing norms rather than final grades for individuals.

Decisions made by these three individuals illustrate specific thought processes used by teachers in making curricular implementation, adaptation and creation decisions. The interview data complemented the questionnaire data and helped preserve the focus on the individual in curriculum decision making. The decisions made by the individual teachers profiled were not contradictory of the group trends observed in the analysis of the combined responses to the questionnaire. The teachers all reported feeling quite autonomous in their decision making. The core reference was heavily relied on as a planning resource and the emphasis was on the core portion of the program. The three were actively involved in implementing and adapting curriculum but none were involved in the creation of locally developed curriculum. The one area in which the three teachers did not support the questionnaire data was that the desire for a more centralized form of evaluation than was currently used was not evident in the individual responses.

Summary and Discussion of Findings

A summary and discussion of the study findings is organized around each of the four research questions initially posed for the study:

1. What is the nature and scope of the teacher decision making

related to curriculum implementation?

The teachers felt quite autonomous in their role as decision makers as they translated the curriculum established at the societal and institutional level into instruction. They did not feel restricted by decisions made at other levels. There was some indication that the amount of control teachers now have over the program is more than they consider ideal - specifically in the area of evaluation where there was a trend to desiring greater centralization of control.

Teachers relied heavily on the prescribed core reference as a source of input into curriculum implementation decisions, even if they had not had a say in its selection. It tended to become the "program of studies" and had a greater influence on implementation decisions than the received curriculum guide. Implementation decisions were also often made in light of the teachers' interest and experience, and input from colleagues. It is significant to note that student experiences and interests were considered of only moderate importance, less influential than six other items.

2. To what extent and in what ways are teachers involved in decision making related to curriculum adaptation?

Teachers reported being actively involved in curriculum adaptation. They did not feel that the curriculum they received was overly prescriptive and made changes which in some instances altered the intent of the received curriculum. The teachers clearly favored

the cognitive, discipline orientated goals over skill, process, or inter-disciplinary goals and planned their programs accordingly. The teachers were primarily concerned with transmitting to the students the core concepts outlined. The core was considered of primary importance and the elective of secondary importance. The time allocated to the elective portion of the program was either usurped by the core or spent on "core-like" material. This program adaptation resulted in a gap between the "intended" and "actual" curriculum. The teachers cited advantages of the core-elective approach similar to those stated in the "received" curriculum but in implementing the program, these theoretical advantages were overruled by the teachers' value system or their "academic rationalism" orientation to curriculum. This orientation also influenced the choice of elective material selected or created for use in the elective portion of the program. Topics selected were influenced more by teacher experiences and interests than by student or local interests. This is supportive of the statements of Walker (1971) and Pylypiw (1974):

> It appears that the force of the teacher's personal background and value system is the most powerful functioning element operating when decisions are made regarding the selection of an area of concentration. Therefore, regardless of other influences such as availability of resources, the recommendations of the provincial or the local guide, the needs and interests of students...all are secondary to the teacher's likes and dislikes, his beliefs, his needs and his interests. (Pylypiw, 1974, p. 146)

Little or no attempt was made to "better fit" a program created for students "in general" but implemented with specific students in specific situations.

3. To what extent and in what ways are teachers involved in decision making related to curriculum creation?

The elective portion of the Chemistry 20 program provides the opportunity for teachers to create curriculum. The teachers cut back considerably on the time allocated to the elective and in the reduced time they most often relied on optional material in the core reference. When this was not available, or additional material was needed, teachers tended to select and adapt curriculum from what was available to them. Less than one third of the teachers were or had been involved in creating curriculum. They felt they had the expertise but not the time to develop curriculum for their Chemistry 20 classes. The list of those units that were developed locally continued to reflect a focus on the discipline and a cognitive orientation. Teachers did not create curriculum to localize or individualize the program.

4. What is the relationship of size of school, prescribed core reference adopted, or professional background of the teacher to curriculum implementation, adaptation or creation decision making?

Generalizations must be cautiously made as the size of the subgroups varied considerably and the number of teachers in some

categories was small (Table 4).

The professional background of the teacher, including years of education and years of Chemistry 20 teaching experience, had little effect on most of the decisions reported by the respondents of the study. Those with more education reported a) being influenced by the curriculum guide, b) feeling knowledgeable in the area of curriculum development, c) desirous of creating curriculum if release time was made available and d) having a final evaluation instrument which measured elective as well as core, more frequently than did those with four or less years of education. Those with eleven or more years Chemistry 20 teaching experience reported a) spending more time on elective topics, b) feeling knowledgeable and having had involvement in curriculum creation, with greater frequency than those with less experience.

Decisions made varied more with the size of Chemistry 20 teaching staff and the prescribed core reference adopted, than they did with the professional background of the teacher.

Keys to Chemistry teachers were currently using an individual teacher examination but, preferred a provincial examination more frequently than did the ALCHEM 20 teachers. The greatest variation occurred in decisions made regarding the elective portion of the program. The Keys to Chemistry teachers spent more time on electives and did not have available or use "optional" material in the core reference. Instead, they selected from available or created elective

curriculum. They a) desired availability of more and better resource materials, b) felt they had the expertise to create curriculum and c) had been involved in curriculum creation more frequently than ALCHEM 20 teachers. The ALCHEM 20 teachers expressed satisfaction with their prescribed core reference more frequently than did Keys to Chemistry teachers and they relied on it for both the core and elective portion of the program. The "optional" material became the "elective" material. The ALCHEM 20 teachers were more apt to see their core reference as the "program of studies," relying less on the curriculum guide, supplementary resources or locally developed materials than the Keys to Chemistry teachers. The Keys to Chemistry teachers selected elective curriculum from supplementary resources or developed it locally. They were more active in curriculum creation than the ALCHEM 20 teachers, however, the elective material selected or created remained very like the core.

The larger staff Chemistry 20 teachers, a) had and desired yet greater centralization of control of evaluation, and b) felt they had the expertise and desired the time to create elective curriculum. Although teachers with colleagues felt more confident and were more desirous of being given time to create elective curriculum, they were actually doing less than their "lone" counterparts. The "lone" Chemistry 20 teachers spent considerably more class time on elective topics and desired availability of more and better materials more frequently than did those teachers with one or more colleagues. The "lone" teachers

relied less on the textbook and desired a common provincial examination less frequently than did the larger staff teachers. When teachers had colleagues also teaching Chemistry 20 they tended to act as a group. The input of many converged to one "acceptable" program rather than diverging and one teacher providing a stimulus to the other. An interdependence seemed to develop that made it easy for the teachers to see advantages of further extending centralization of control. The "lone" teachers had perhaps become accustomed to acting independently and as a result were far less desirous of having this independence infringed upon.

In this chapter the results of the inquiry into the teachers' role in curriculum decision making were reported. The questionnaire findings were presented as frequency counts, percentages, weightings and rank ordering of combined responses and augmented by a small amount of interview data. The teachers in the sample were making decisions of significance as they implemented, adapted and created curriculum.

Chapter V contains a summary of the investigation, considers some of the implications of the study and suggests foci for further research.

CHAPTER V

STUDY SUMMARY, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS FOR FURTHER RESEARCH

The study was exploratory, the sample was small and drawn from one geographical area, and therefore findings are not generalizable. The results, when used cautiously, however, have implications for the educational community and suggest foci for further research.

Summary of Procedure and Findings

The intent of the study was to look at teacher made curricular decisions in a naturalistic setting and to describe what was observed. The review of the literature had pointed out the critical role of the teacher in curriculum decision making as they implemented, adapted and created curriculum for their classes and had highlighted the lack of research into the nature and scope of decision making that is actually taking place at the instructional level. Four research questions provided the focus for the investigation into the teachers' perceptions of their curricular decision making. A questionnaire and interview schedule were developed to gather the data. Three teachers were interviewed individually and questionnaires were sent or delivered to seventy Chemistry 20 teachers in the Edmonton vicinity. Sixty one of the questionnaires were completed and returned providing a 87.1% response. The sample was categorized according to the size

of their Chemistry 20 staff, the prescribed core reference adopted, their years of education and years of chemistry teaching experience. The teachers' decision making role in curriculum implementation, adaptation and creation was examined for the sample as a whole and for the subgroupings identified (Table 4).

The teachers in the sample were found to make significant curricular decisions. The curricular decisions made were more influenced by the size of the Chemistry 20 staff and core reference adopted than by the professional background of the teacher. Functioning at the interface of curriculum and instruction teachers translated an intended curriculum into instruction, making decisions in an environment they perceived to be relatively unrestrictive. They adapted the program they received in light of their value system and conception of curriculum rather than their specific situation. It was the universal, cognitive concepts which were emphasized in the core and the elective portions of the program. Teachers were involved in implementing and adapting curriculum to a greater extent than in creating curriculum.

The findings of this study were supportive of the minimal number of other studies inquiring into "what is", that are reported on in the literature. Curricular decisions made by the teacher were critical in determining the nature of the program actually offered the students (McLune, 1970; Doll, 1978; Eisner, 1979). As Olson (1978) had reported, the teachers reacted favorably to centralization of control and were reluctant to become involved in curriculum creation. As

Poll (1970) had also found, the prescribed textbook was considered a more important source of input into curriculum decision making than the curriculum guide. The discipline and cognitive orientation of the teachers functioned much as the "platform" suggested by others (Walker, 1970; McFarland, 1975). It, rather than situational factors, was the basis for much of the curriculum adaptation decision making.

Conclusions and Implications

The conclusions drawn are supported by the explicit and implicit content of the findings reported in Chapter IV. These conclusions combined with a discussion of their implications are in a sense the essence of the study and are often suggestive of areas needing further exploration. The problem is ongoing and as such, the conclusions reached by this exploratory study will hopefully be reviewed and reconsidered in the light of findings of future studies.

The teachers tended to make their curriculum implementation decisions autonomously and did not feel restricted by other levels of decision making. This is not because the intended curriculum lacked prescriptiveness. Instead teachers opted for their own level of decision making and adapted or ignored prescriptive statements. As Doyle and Ponder (1977) state the "norm of autonomy (or individualism) operating among teachers appears to have effectively minimized the impact of outside influences on the classroom" (p. 2). This is most evident in the consideration of the core-elective organization of the

program. Teachers regarded the terms "core" to mean "important" and "elective" to mean "less important." This is specifically cautioned against in the curriculum guide, so some means has to be found of convincing teachers that "elective" also means "important" if the gap between the adopted and the implemented program is to be reduced. It would seem that the teachers' emphasis on the core was closely associated with their emphasis on the cognitive. The program of studies specifically outlines the core concepts and the textual materials prescribed elaborate on these concepts, but the teachers are left on their own to find materials or design strategies for achieving the other objectives dealing with historical development, application, appreciation and integration. Perhaps the teachers are reading an implicit emphasis on the cognitive into the course as outlined in the program of studies. If indeed the "received" curriculum intends a broader range of objectives (as it states), then teachers will have to be convinced of this and ways found to encourage them to broaden their emphasis. One wonders what, if any, incentives are currently provided to have teachers move in that direction. When teachers focus on the core and the cognitive they are perhaps rewarded by having students do well in the next class because the cognitive concepts are the building blocks of the three year chemistry program. If what was considered "core" also clearly reflected a broader range of objectives perhaps teachers would be convinced that integration, appreciation, history and/or application were also goals of high priority.

The gap between the intended and implemented curriculum was less evident with the "lone" Chemistry 20 teachers than with the larger staff teachers. When there were two to six Chemistry 20 teachers on a staff the trend was to "concensus" and a centralization of decision making. This had the effect of keeping the program more "traditional" and "change resistant" and created a larger gap between the intended and implemented program than when the teacher worked alone. This finding has implications for the organizational structure of the large high schools. What can be done to encourage a sense of professional independence among teachers who must work closely together? Are larger departments intimidating and hierarchical rather than encouraging and supportive? The "bigger is better" syndrome is questionable when the gap between the "actual" and "intended" curriculum is greater in the larger schools than in the smaller. Traditionally the rural schools have looked to the urban schools for leadership - the findings of this study suggest that the reverse would have benefits as well.

In implementing the curriculum, teachers continued to rely heavily on the prescribed core reference even if they had not been consulted in its selection and despite the advantages listed in the curriculum guide of using a variety of resources. This has implications for those selecting and developing core references. The more complete the textbook, the less likely teachers are to look elsewhere or to develop their own materials. Once the core reference is selected, many other curricular decisions made by the teacher are influenced by

the choice.

In addition to the prescribed reference, the teachers relied on their own experiences and interests and those of their colleagues in their curricular decision making. Student interest and experience was not a strong influence. If the desire of other levels of decision making is to localize and individualize the curriculum, then the impetus and encouragement will have to be provided, as the teachers are moving toward greater standardization and centralization of control. Teachers may have focused more on students when deciding "how" to teach, but when given the opportunity to choose "what" to teach, local and student interests had little influence. Teachers showed little inclination to change the course to better fit specific groups of students or to increase it's appeal to a broader range of students. Instead, they expressed the desire to have better prepared students (change the learner) to better fit the course. This would imply a rather elitist view of the chemistry program, cognitive and discipline orientated. There is little evidence that teachers saw chemistry as part of the educational Gestalt - integrated with other sciences, technology and society,and with long as well as short range benefits to the student. The role of Chemistry 20 in a student's education was regarded more as an opportunity to build on concepts developed in Chemistry 10 and to prepare students for Chemistry 30.

Underlying the decisions that teachers made as they implemented and adapted curriculum was a very influential "platform" from which

they functioned. The study findings, however, indicate that teachers were generally more concerned with practical, day to day considerations, such as large classes, time shortage and inadequate laboratory facilities, than with their teaching epistomology. There was little evidence that teachers asked themselves "Why should this course be offered?" or reflected on or critically examined their educational philosophy. It would be of interest to know: How cognizant and critical are teachers of their individual "platforms"? What role or responsibility do teacher education institutions have in developing and increasing the awareness of this epistomology?

Teachers feel that they have the expertise to develop curriculum but few are actively doing so. What is perhaps even more crucial is that teachers do not see curriculum creation as an integral part of their role or job description. If teachers are to become more involved in this area of decision making they must see it more clearly as a teaching responsibility. This could be promoted by teacher education facilities, school districts and school administration. The issue of teacher involvement in curriculum creation is closely linked to the "teacher as professional" or "teacher as technician" controversy. The implication is that curriculum creation is a higher order task than curriculum implementation or adaptation,and if teachers tend away from this area of decision making (as was the case with 70% of this sample) their status tends to the latter rather than the former. Those teachers that are involved are developing curriculum about "core-like"

topics that are discipline rather than student or community centered. This has a number of implications. Ways have to be found of encouraging teachers to focus on a variety of affective, skill and interdisciplinary goals instead of restricting themselves to the cognitive domain. Perhaps teachers know how to develop only one kind of curriculum - that which focuses on the cognitive. Ways have to be explored of encouraging teachers to use the expertise they feel they have in curriculum development. Perhaps teacher education should concentrate more on having teachers actually develop curriculum rather than on the theory of how to develop materials. Early experience may encourage teachers to "do" rather than "know." Currently those who take time to develop curriculum are rewarded with an "increased workload." Teachers often mentioned "time" as the reason they were not actively involved in curriculum creation. It may seem to teachers that the cost factor of curriculum development, the amount of investment necessary compared to the amount of return, is currently too great. Ways have to be explored of altering this cost ratio if teachers are to take advantage of the curriculum creation opportunities afforded them. Increased teacher participation in curriculum creation would enhance the elective portion of the program and contribute to the implementation of the intended curriculum.

Teachers are not pushing for greater control of the curriculum. If the current trend is to greater decentralization of curriculum decision making, it would appear to be more thrust upon them than

demanded by them. Teachers are not showing initiative or accepting the curriculum decision making opportunities offered them. In favoring a move to a more centralized evaluation procedure they appear to be willing to give up some of the control they now have. Do they distrust their own or their colleagues ability to individually measure student achievement? What can be done to enhance teachers' confidence in their ability to carry out professional responsibilities which include more than the technical aspects of teaching? What is the role of teacher education institutions and professional associations in encouraging teachers to accept an expansion of their curriculum decision making responsibilities.

Suggestions for Further Research

In the discussion of the implications of this study many unanswered questions have already been identified. From an exploratory study of this nature there arise many possible foci for further research.

This study involved a small sample from one geographical location. Would the findings of an empirical, province-wide study be consistent with this exploratory study?

An intensive study of the curriculum decision making of a few individuals would perhaps indicate some of the reasons underlying the decisions made by the sample of this study. The importance of the "platform" from which individuals make their decisions requires a research methodology which would elucidate the underlying assumptions

held by the teachers and which influence their decision making. In this way perhaps some of the "below the surface" data would be revealed to augment the findings of this study.

This study focused on teacher perceived curricular decision making. The students may perceive and experience another curriculum. Another study could focus on the student experience and gather data by classroom observation and student interview techniques.

Teachers were found to be "adapting" rather than "adopting" the received curriculum. It would be of interest to know how these adaptations are affecting student experience and outcomes. What effect does the emphasis on the cognitive have on student learnings? Does increasing the time spent on core result in greater mastery of core concepts? What effect does the elimination of the elective portion of the program have on student achievement, attitudes, and perceptions of the long term benefits of the program?

Another study could examine how school organization is affecting decisions made by teachers. What are some of the advantages and disadvantages of large staff associations? Similarly, program organization could be studied. Are there ways other than the core-elective approach of reaching the desired program goals?

The teachers were recognized as significant decision makers. How skilled are they at decision making? Is it a skill which is emphasized in their teacher education? How could their decision making ability be improved?

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APPENDIX A

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CURRICULUM DECISION MAKING IN CHEMISTRY 20:
A TEACHER QUESTIONNAIRE

PART I GENERAL INFORMATION

1. My school is located in a community with a population of:

_____ less than 1000

_____ 1000 - 4999

_____ 5000 - 29 999

_____ 30 000 - 99 999

_____ 100 000 or more

2. My school contains grades:

____ K or 1 - 12

____ 7 - 12

____ 10 - 12

____ other (please specify)_____

3. The approximate number of full time teachers in my school is:

____ 1 - 9

____ 10 - 24

____ 25 - 39

____ 40 or more

4. The number of teachers teaching at least one class of Chemistry 20 in my school is:

____ 1

____ 2 - 3

____ 4 or 5

____ 6 or more

5. The years of university education for which I am being paid is:

____ 2 or less

____ 3 or 4

____ 5

____ 6 or more

6. Degrees obtained are:

_____

7. My total years of teaching experience is:

____ 1 or less

____ 2 - 5

____ 6 - 10

____ 11 - 15

____ 16 or more

8. My total years of Chemistry teaching experience is:

____ 1 or less

____ 2 - 5

____ 6 - 10

____ 11 or more

9. The prescribed Core textbook used in my Chemistry 20 classes is:

____ Keys to Chemistry
Ledbetter et al. .....%

____ ALCHEM 20
Jenkins et al. .....%

____ both of the above
(indicate to the right of the titles the percentage reliance on each)

10. Chemistry 20 classes normally comprise approximately ___% of my teaching load.

____ 20% or less

____ 21 - 40%

____ 41 - 60%

____ 61 - 80%

____ more than 80%

11. Other subjects that I am teaching are:

_____

_____

Thank you for this background information. Please proceed to PART 2 which deals with curricular decisions you make in teaching Chemistry 20.

PART II

1. Instructors may desire many qualities for their students. From the following list, select the three you most want your Chemistry 20 students to achieve. Rank your selections 1 (high), 2 or 3 according to the extent you emphasize the goal in your classes.

_____ Understand/appreciate interrelationships of science and technology with society

_____ Be able to understand scientific research literature

_____ Apply principles learned in the course to solve qualitative and/or quantitative problems

_____ Develop proficiency in laboratory methods and techniques of the discipline

_____ Relate knowledge acquired in class to real world or community systems and problems

_____ Understand the principles, concepts and terminology of the discipline

_____ Aquire a knowledge and appreciation of the history and philosophy of chemistry

_____ Aquire knowledge and attitudes toward chemistry which will assist in vocation selection

_____ Develop appreciation/understanding of the scientific method

2. To what extent do you teach the following concepts in the Core portion of your Chemistry 20 program?

1	2	3	4	5
I do not teach	I only mention	I teach lightly	I give moderate attention	I give heavy emphasis

Circle the number which best describes your practice.

Solutions are mixtures	1	2	3	4	5
Formation of aqueous solutions is a chemical reaction	1	2	3	4	5
Concentration represents the proporation of solute to solvent.....	1	2	3	4	5
Chemical substances exist as elements bonded together	1	2	3	4	5
Organic chemistry can be termed carbon chemistry	1	2	3	4	5
Hydrocarbons form an important group of chemicals	1	2	3	4	5
Hydrocarbon derivatives form another important group of chemicals	1	2	3	4	5

3. List the 3 main advantages of including elective topics in a Chemistry 20 program.

1. _____

2. _____

3. _____

4. The following list contains possible sources of input into curriculum decision making. According to your estimate of their relative importance to you in your classroom, please rate each one on the following scale:

1) of no importance
2) of little importance
3) important
4) very important

selected textbooks and teachers manuals	1	2	3	4
periodicals and newspapers	1	2	3	4
in-service workshops	1	2	3	4
personal experiences and interests	1	2	3	4
supplementary books and A.V. materials.....	1	2	3	4
provincial curriculum guides	1	2	3	4
formal professional development courses ..... (University, locally or commercially sponsored)	1	2	3	4
students' experiences and interests	1	2	3	4
curriculum consultants (district or provincial)	1	2	3	4
opinions of parents, community groups, etc.	1	2	3	4
discussion and input from colleagues (teachers and/or administrators)	1	2	3	4
laboratory materials and workbooks	1	2	3	4
professional associations or councils	1	2	3	4

5. The Alberta Education Curriculum Guide suggests that approximately 25 hours of the 65 hours class time in Chemistry 20 be allocated to the study of elective topics.

a) How many hours of your class time do you <u>actually</u> spend on elective topics?

_____

b) If your response to (a) is <u>less</u> than 25 hours, indicate which of the following factors influenced your time distribution. Rank the <u>three</u> factors 1 (high), 2 or 3 according to the extent of their influence on your decision.

_____ Core topics are more important than elective topics

_____ Core topics cannot be managed in the time suggested

_____ Lack of facilities

_____ Lack of interest (student or teacher) in elective topics

_____ Lack of materials and/or resources for elective topics

_____ Lack of time to develop elective curriculum

_____ Other (Comment)_____

_____

POOR COPY
COPIE DE QUALITEE INFERIEURE

6. a) You may have included one or more of the following elective topics in your Chemistry 20 program this year. Indicate with a check to the left of the topic those that you taught. If you check more than one, indicate to the right the approximate number of hours spent on each topic.

_____ Chemistry of the Car ..... hours

_____ Environmental Chemistry .....

_____ Polymers: Long Chair Molecules .....

_____ Biochemistry .....

_____ Qualitative Analysis .....

_____ A locally developed unit .....

(please specify) _____

_____ Topics or exercises considered optional but included in prescribed core texts .....

_____ Other (please specify) _____

b) Choose the response which best fits your situation.
The elective material used would primarily be considered:

_____ An extension of a core topic

_____ An indepth, intensive study of a core topic

_____ Core theory put into an applied context

_____ Topics unrelated to the core

c) Which three factors had the greatest bearing on the topic(s) selected for the elective portion of the program? Rank the most influential 1 (high) 2 or 3.

_____ The decision was made at another level

_____ School facilities

_____ My personal experience, knowledge, interest etc.

_____ Local (community) interests

_____ Student characteristics and/or preference

_____ Other (please specify) _____

7. Opinion varies as to who should be responsible for measuring final student achievement in Chemistry 20.

a) Indicate with a check mark how general a final evaluation instrument is currently used in your class.

_____ common district examination

_____ common school-wide exam

_____ individual teacher exam

b) Indicate with a check mark how general a final evaluation instrument you would consider to be ideal.

_____ common provincial exam

_____ common district exam

_____ common school-wide exam

_____ individual teacher exam

8. Circle the response which best reflects your thinking or situation

SA - strongly agree
A - agree
D - disagree
SD - strongly disagree

a) In my teaching I am consciously influenced by the objectives which are specified in the Alberta Education Curriculum Guide. SA A D SD

b) I have opportunity for significant input into the selection of the prescribed core textual materials used in my Chemistry 20 classes. SA A D SD

c) I am well satisfied with the core textual materials prescribed for use in my Chemistry 20 classes. SA A D SD

d) I make a clear distinction between elective and core material to my students. SA A D SD

e) I find the Alberta Education Curriculum Guide is overly prescriptive and does not allow me enough freedom to adequately meet the needs of my students. SA A D SD

f) I find that I frequently have to use time intended for the elective portion of the Chemistry 20 program to continue teaching core material. SA A D SD

g) What I am actually doing in the elective portion of the Chemistry 20 program is far from what I consider to be ideal. SA A D SD

h) I have been or am currently involved in the creation of a locally developed unit. YES NO

i) I feel I have the knowledge and expertise needed to develop a curricular unit for my classes. SA A D SD

j) I feel that teachers should concentrate on adapting available materials for their classes rather than trying to create their own curricular unit. SA A D SD

k) Final student evaluation in my Chemistry 20 classes reflects achievement in the elective portion of the program as well as the core. SA A D SD

9. Please indicate who you feel you must consult or receive permission from to do the following:

	I make the decision alone	colleagues	department head	school administrator	students	district office staff	Alberta Education staff	Other
add materials to supplement core resources								
alter the time allotment for various prescribed units of study								
select goals, topics and resources for elective portion or program								
design a final evaluation procedure and examination for students								

10. Rank the following items to indicate the <u>three</u>, 1 (high), 2, 3, that would contribute the most to an improved Chemistry 20 program for your students.

_____ more freedom to choose materials

_____ more interaction with colleagues and/or administrators

_____ less interference from colleagues and/or administrators

_____ smaller classes

_____ more teacher-aide time

_____ more clerical assistance

_____ availability of more or better media or instructional materials

_____ changed course outline

_____ instructor release time to develop course and/or materials

_____ different goals and objectives

_____ professional development opportunities

_____ better laboratory facilities

_____ students better prepared to handle course requirements

_____ increasing the time actually spent on elective topics

_____ other (please specify) _____

... ...

Thank you. A stamped, self-addressed envelope has been enclosed. I will be looking forward to receiving the completed questionnaire. I sincerely appreciate your time and responses.

Questions to Guide the Interview

1. How do you begin planning your Chemistry 20 program? What is your starting point? What is your main resource? What is the role of the curriculum guide and the text?

2. What do you think is the prime goal of the Chemistry 20 program?

3. Do you like the way the program is divided into core and elective? Do you give particular emphasis to any of the core areas? Why? What affects this decision? Did you select the prescribed core reference used in your classes? Were you consulted on the decision? If you are not involved in the selection who is?

4. How much class time do you spend on electives? Why? Which elective topics do you cover? Why? When do you cover elective topics? Why? Do you make these decisions regarding the elective? If not, who does? Do you like having elective programming? What are some of the advantages or disadvantages of having time allocated to elective topics. Is your treatment of elective topics satisfactory to you? Why?

5. Who or what restricts your decision making in the Chemistry 20 program? Does the curriculum guide give you too much or too little freedom? Do you construct your own final evaluation instruments for your students? If not, who is responsible for this task? Who do you think should ideally evaluate Chemistry 20?

6. What do you like best about the existing Chemistry 20 program? What do you see as the weakest dimension of the program? What changes would most improve your current program?

7. Are you currently involved in developing curriculum for your Chemistry 20 classes? What? Why? Have you been involved in the past? Do you think it is part of a teacher's job?

APPENDIX B

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DEPARTMENT OF SECONDARY EDUCATION
FACULTY OF EDUCATION
THE UNIVERSITY OF ALBERTA

March 9, 1981

Dear

I seek your permission to invite some of the Chemistry 20 teachers in your jurisdiction to participate in a study being conducted by a M. Ed. student, Shirley Buauer. The study seeks to identify teachers' perceptions of the nature and scope of their curricular decision making.

Curriculum decision making goes on wherever there are people interested in, or responsible for, an educational program; however, the teachers' role is considered critical because of their proximity to the students. This investigation will focus on teachers' perceptions of decisions they make while involved in curriculum implementation, adaptation and creation.

Two major data sources are planned. A questionnaire which has been previously piloted and subsequently revised will be sent to approximately onehundred Chemistry 20 teachers in North Central Alberta during the period March 20 - 30. In addition, eight Chemistry 20 teachers will be individually interviewed to provide a second more indepth data source. The anonymity will be assured of the teachers who agree to be interviewed or complete a questionnaire. About one-half of the teachers in your system would be invited to participate. Upon completion results of the study would be forwarded to you.

May I thank you at this time for your favorable consideration.

Yours truly,

M. A. Nay

Marshall A. Nay,
Professor

338 EDUCATION SOUTH, EDMONTON, ALBERTA, CANADA • T6G 2G5 • TELEPHONE (403) 432-3674

List of Participating Jurisdictions

County of Barrhead

County of Beaver

County of Camrose

County of Lac St. Anne

County of Lamont

County of Leduc

County of Parkland

County of Strathcona

County of Thorhild

County of Wetaskiwin

Sturgeon School Division

Westlock School Division

Devon School District

Edmonton School District

Edmonton R.C.S.S. District

St. Albert P.S.S. District

Sherwood Park C.S.S. District

Wetaskiwin School District

4 Sorrel Crescent
St. Albert, Alberta
March 20, 1981

Dear Chemistry 20 teacher:

Curriculum decision making occurs wherever there are people interested in or responsible for an educational program. The teacher's role is considered critical, however, because it is in the learning situation itself that the final determination of the curriculum takes place. It is the classroom teacher that makes the decisions which directly affect the student experience yet very little is known about the nature and scope of the curricular decisions that teachers actually make while involved in curriculum implementation, adaptation and creation. This, very briefly, is the focus of a study I have undertaken as part of my M.Ed. thesis work in Secondary Education under the direction of Dr. M. Nay.

The research design involves the use of a questionnaire which is being distributed to approximately 100 Chemistry 20 teachers in North Central Alberta. I know the demands on your time are great, but I hope that you will find 20 minutes to complete the enclosed questionnaire and return it to me by April 15 in the self addressed stamped envelope provided. Anonymity of all respondents is assured.

I have previously written the Superintendent of Schools and have received permission to contact you. May I thank you at this time for the courtesy of your assistance.

Yours sincerely,

Shirley Brauer

SB:js
encls.

4 Sorrel Crescent
St. Albert, Alberta
March 20, 1981

Dear Chemistry 20 teacher:

Curriculum decision making occurs wherever there are people interested in or responsible for an educational program. The teacher's role is considered critical, however, because it is in the learning situation itself that the final determination of the curriculum takes place. It is the classroom teacher that makes the decisions which directly affect the student experience yet very little is known about the nature and scope of the curricular decisions that teachers actually make while involved in curriculum implementation, adaptation and creation. This, very briefly, is the focus of a study I have undertaken as part of my M.Ed. thesis work in Secondary Education under the direction of Dr. M. Nay.

The research design involves the use of a questionnaire which is being distributed to approximately 100 Chemistry 20 teachers in North Central Alberta. I know the demands on your time are great, but I hope that you will find 20 minutes to complete the enclosed questionnaire and return it to your department head by April 23. I will be picking them up at that time. Anonymity of all respondents is assured.

I have previously written the Superintendent of Schools and have received permission to contact you. May I thank you at this time for the courtesy of your assistance.

Yours sincerely,

Shirley Brauer

SB:js

encls.

4 Sorrel Crescent
St. Albert, Alberta
April 7, 1981

Dear Chemistry 20 teacher:

Several weeks ago, you were one of about seventy teachers to receive a questionnaire on Curriculum Decision Making in Chemistry 20. The response to date has been excellent as approximately 85% of the questionnaires have been returned. In order to ensure as complete data as possible, I would appreciate receiving completed questionnaires until May 20. If you have already returned the questionnaire kindly ignore this reminder. Thank you again for your help.

Yours sincerely,

Shirley Brauer

APPENDIX C

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Six Objectives of Chemistry 20 (Alberta Education) 166

Time Prescribed for the Elective (Alberta Education) 166

Advantages of the Elective (Alberta Education) 167

CHEMISTRY 20

Objectives of the Chemistry 20 Program:

After participating in the activities and completing the requirements of this course, the student should:

20.1 Know the chemical principles underlying the chemistry specified in the core outline.

20.2 Be skilled in using proper laboratory techniques used by chemists and laboratory personnel.

20.3 Comprehend the historical development of the chemistry principles being studied.

20.4 Have the capacity to apply the knowledge and skills of chemistry to other situations involving chemicals at home and in industry.

20.5 Have interests and attitudes toward chemistry that will assist in the choice of vocations.

20.6 Know the chemistry facts and principles related to the open discussion of social issues of current interest.

Organization of Program:

Approximately 40 hours of instructional time shall be devoted to the core topics and about 25 hours to elective topics. The content of the elective units is to relate to the core in one of three ways:

a. an extensive study of a core topic (breadth)
b. an in-depth, intensive study of a core topic, or
c. a practical application of a core topic.

Prescribed Core References

Ledbetter, E. W. and J. A. Young, *Keys to Chemistry*. Don Mills: Addison-Wesley, 1977

Ledbetter, E. W. and J. A. Young, *Laboratory Keys to Chemistry*. Don Mills: Addison-Wesley, 1977

Gortler, L. B. et al, *Keys to Organic Chemistry*. Don Mills: Addison-Wesley, 1977

Jenkins, F. et al, *ALCHEM 20*. Edmonton: E.P.S. District #7, 1977

Recommended Core References

Courneya, D. and H. McDonald, *The Nature of Matter*. Toronto: D. C. Heath and Company, 1976

Whitman, R. L. and E. E. Zinck, *Chemistry Today*. Scarborough: Prentice-Hall, Canada, 1976

IAC Modules
Atkinson, G. and H. Heikkinen, *Reactions and Reason*
Huheey, J., *Diversity and Periodicity*
DeVoe, H., *Communities of Molecules*
Jarvis , B. and P. Mazzocchi, *Form and Function*
Don Mills: Fitzhenry and Whiteside (Harper and Row), 1973

THE CURRICULUM STRUCTURE

1. This program is developed on a core-elective method of curriculum organization. Briefly this means that a core occupying fifty to sixty percent of the time allotment will be prescribed for all schools in Alberta. An elective portion of approximately forty to fifty percent of the time will be allowed for modules which take advantage of local interest, expertise, and facilities. It is felt that this approach allows for a number of advantages.

a. It provides for both flexibility and uniformity.

b. Because the core would contain those parts of the course which are relatively constant and the elective modules would contain those parts of current interest, this system of organization would allow for up-dating on a continuous basis.

c. Local interests, facilities, and expertise can be brought into the chemistry program very easily.

d. Modules which involve more than one discipline could be developed. There is a concern that science has become too specialized and modules of this type would counteract this impression.

e. This approach is somewhat adaptable to individualization.

f. This approach also can adapt quite easily to a variety of teaching materials.

2. The basic structure of the chemistry program is a core set of concepts running through the three years of Chemistry 10, 20 and 30, and a minimum of 4 elective modules.

It is the intention that these elective modules accommodate and augment class preferences, individual differences and teacher specialties. In general, the elective modules are to be of about 1 credit's worth of time, although there is no intention to be restrictive in format or in time allotments as long as the objectives are being addressed and met. The intent of this portion of the program is to provide some limited opportunities for modification of the program to suit local needs and at the same time provide a measure of consistency across the province.

3. Some points to keep in mind when using the core-elective program:

a. Care must be taken to ensure that a balanced treatment of the elective objectives is achieved. It is easy to usurp some of the time allotted to elective modules to cover the "more important" core material. The philosophy of the core-elective approach dictates that this be scrupulously avoided.

b. Another underlying advantage of the core-elective approach is its adaptability to change. Those aspects of the program which are most susceptible to change can be placed in the elective part while the more stable aspects can be kept in the core. Care then must be taken to ensure that suitable material is placed in each of these two parts.

c. The elective nature of the program does not imply lack of structure. Structure in the form of objectives and content should be there but not to the detriment of the intent of the program. If opportunity to enhance the program presents itself but requires changing of the organization of the modules the freedom exists to change it. Whether change "in mid-stream" should be made in a module is up to the professional judgment of the teacher.

d. Another underlying advantage is that this kind of curriculum is not dependent on one set of materials but can be taught using a variety of materials available. In fact it can best be taught if there is a variety of materials available.

APPENDIX D

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Frequency Distribution on Item 4 170

Frequency Distribution on Item 8 171

FREQUENCY DISTRIBUTION OF QUESTIONNAIRE RESPONSES: ITEM 4

Sources of Input	1 no importance	2 little importance	3 important	4 very important
Selected Textbooks and Teachers Manuals	0	3	24	32
Laboratory materials and work books	0	2	30	27
Personal Experiences and interests	0	7	30	23
Discussion and input from colleagues	1	8	34	17
Supplementary books and A.V. Materials	1	11	33	12
Formal Professional development courses	2	17	32	7
Students' experiences and interests	1	23	28	7
Provincial Curriculum guides	3	24	21	12
In-Service workshops	5	18	27	5
Professional Assoc. or councils	6	23	25	4
Periodicals and newspapers	4	28	25	3
Opinions of parents community groups etc.	15	26	11	3
Curriculum consultants	18	29	12	0

FREQUENCY DISTRIBUTION OF QUESTIONNAIRE RESPONSES: ITEM 8

Decision Item	Group	1 (SA)	2 (A)	3 (D)	4 (SD)
In my teaching I am consciously influenced by the objectives which are specified in the Alberta Education curriculum guide.	Total Sample	13	37	10	1
	"Lone" teachers	6	14	5	0
	Larger staff teachers	7	23	5	1
	Keys to Chemistry teachers	6	8	1	1
	ALCHEM 20 teachers	6	28	9	0
	Teachers with 4 or less years education	2	16	5	1
	Teachers with 5 or more years education	11	21	5	0
	Less experienced teachers	9	20	4	0
	More experienced teachers	4	17	6	1
I have opportunity for significant input into the selection of the prescribed core textual materials used in my Chemistry 20 classes.	Total Sample	14	17	22	5
	"Lone"teachers	6	8	10	1
	Larger staff teachers	8	9	12	4
	Keys to Chemistry teachers	6	3	5	1
	ALCHEM 20 teachers	7	14	16	4
	Teachers with 4 or less years education	6	7	9	1
	Teachers with 5 or more years education	8	10	13	4
	Less experienced teachers	6	11	12	2
	More experienced teachers	8	6	10	3

Decision Item	Group	1 (SA)	2 (A)	3(D)	4 (SD)
I am well satisfied with the core textual materials prescribed for use in my Chemistry 20 classes.	Total Sample	13	26	13	8
	"Lone"teachers	6	10	6	3
	Larger staff teachers	7	16	7	5
	Keys to Chemistry teachers	3	4	3	5
	ALCHEM 20 teachers	10	22	10	3
	Teachers with 4 or less years education	3	13	7	1
	Teachers with 5 or more years education	10	13	6	7
	Less experienced teachers	8	15	6	4
	More experienced teachers	5	11	7	4
I make a clear distinction between elective and core material to my students.	Total Sample	4	16	29	9
	"Lone"teachers	2	9	11	3
	Larger staff teachers	2	7	18	6
	Keys to Chemistry teachers	0	4	7	4
	ALCHEM 20 teachers	4	12	20	5
	Teachers with 4 or less years education	2	6	13	3
	Teachers with 5 or more years education	2	10	16	6
	Less experienced teachers	4	8	15	4
	More experienced teachers	0	8	14	5

Decision Item	Group	1 (SA)	2 (A)	3(D)	4 (SD)
I find the Alberta Education curriculum guide overly prescriptive and does not allow me enough freedom to adequately meet the needs of my students.	Total Sample	1	5	40	12
	"Lone"teachers	0	2	15	7
	Larger staff teachers	1	3	25	5
	Keys to Chemistry teachers	0	2	8	6
	ALCHEM 20 teachers	1	3	30	6
	Teachers with 4 or less years education	0	1	18	4
	Teachers with 5 or more years education	1	4	22	8
	Less experienced teachers	0	2	22	6
	More experienced teachers	1	3	18	6
I find that I frequently have to use time intended for the elective portion of the program to continue teaching core material.	Total Sample	21	26	11	1
	"Lone"teachers	9	9	5	1
	Larger staff teachers	12	17	6	0
	Keys to Chemistry teachers	4	5	6	1
	ALCHEM 20 teachers	16	21	4	0
	Teachers with 4 or less years education	8	8	7	1
	Teachers with 5 or more years education	13	18	4	0
	Less experienced teachers	13	12	6	1
	More experienced teachers	8	14	5	0

Decision Item	Group	1 (SA)	2 (A)	3(D)	4 (SD)
What I am actually doing in the elective portion of the Chemistry 20 program is far from from what I consider to be ideal.	Total Sample	7	26	22	2
	"Lone"teachers	1	10	13	1
	Larger staff teachers	6	16	9	1
	Keys to Chemistry teachers	2	6	5	2
	ALCHEM 20 teachers	5	20	15	0
	Teachers with 4 or less years education	3	11	8	2
	Teachers with 5 or more years education	4	15	14	0
	Less experienced teachers	4	15	9	1
	More experienced teachers	3	11	13	1
I feel that I have the knowledge and expertise needed to develop a curricular unit for my classes.	Total Sample	16	28	13	2
	"Lone"teachers	3	13	8	1
	Larger staff teachers	13	15	5	1
	Keys to Chemistry teachers	6	7	2	0
	ALCHEM 20 teachers	10	19	11	2
	Teachers with 4 or less years education	3	11	9	1
	Teachers with 5 or more years education	13	17	4	1
	Less experienced teachers	8	15	9	2
	More experienced teachers	10	13	4	0

Decision Item	Group	1 (SA)	2 (A)	3(D)	4 (SD)
I feel that teachers should concentrate on adapting available materials for their lessons rather than trying to create their own curricular unit.	Total Sample	4	34	17	3
	"Lone"teachers	1	18	6	0
	Larger staff teachers	3	16	11	3
	Keys to Chemistry teachers	2	6	6	1
	ALCHEM 20 teachers	2	27	11	2
	Teachers with 4 or less years education	2	14	6	1
	Teachers with 5 or more years education	2	20	11	2
	Less experienced teachers	3	18	8	2
	More experienced teachers	1	16	9	1
Final student evaluation in my Chemistry 20 classes reflects achievement in the elective portion of the program as well as the core.	Total Sample	16	28	10	4
	"Lone"teachers	9	13	3	4
	Larger staff teachers	7	15	7	4
	Keys to Chemistry teachers	3	7	5	1
	ALCHEM 20 teachers	13	19	5	3
	Teachers with 4 or less years education	5	11	5	3
	Teachers with 5 or more years education	11	17	5	1
	Less experienced teachers	9	12	7	2
	More experienced teachers	7	16	3	2